CHAPTER 4

LIQUID OXYGEN CONVERTER ASSEMBLY TYPE GCU-24/A, P/N 10C-0016-10A

Section 4-1. Description

4-1. GENERAL.

4-2. The Liquid Oxygen Converter Assembly, Type GCU-24/A, P/N 10C-0016-10A, (figure 4-1) is manufactured by Essex Industries, Inc. (CAGE 83533). The converter assembly is designed to store and convert liquid oxygen (LOX) into gaseous oxygen for the aircrewman during flight. Table 4-1 contains the leading particulars for the converter assembly.

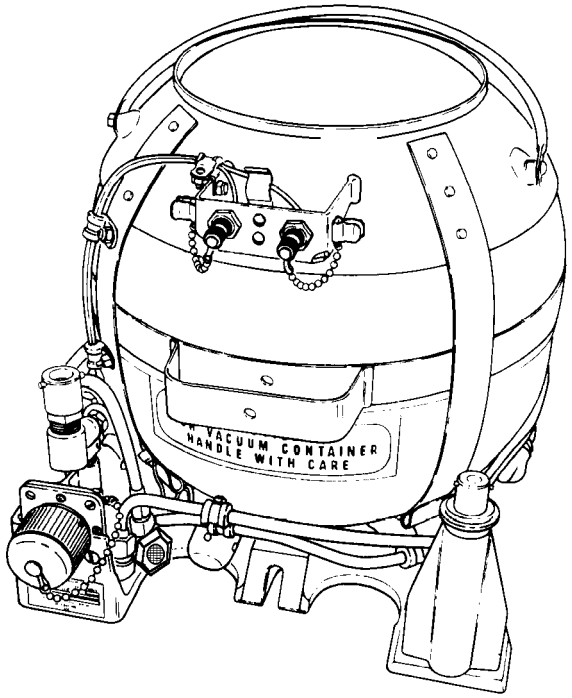

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Figure 4-1. Liquid Oxygen Converter Assembly, Type GCU-24/A, P/N 10C-0016-10A

Table 4-1. Leading Particulars

Capacity (LOX)	10 liters
Operating pressure	55 to 90 psig
Operating temperature range	-65°F (-54°C) to +260°F (+127°C)
Relief valve setting	100 to 120 psig
Pressure closing valve setting	55 to 90 psig
Delivery rate	120 lpm (min)
Filling time at 70°F	10 min
Buildup time (max)	5 min
Burst disc rupture range	225 psig at 72°F

4-3. Oxygen in its liquid state (approximately -297°F (-182°C)), is stored in a spherical assembly consisting of inner and outer shells separated by an annular space. The annular space is evacuated, creating a vacuum, preventing the transmittal of heat through the space. The thermos bottle effect created retards heating and eventual conversion of LOX to gaseous oxygen. Valves, tubing and fittings incorporated in the converter assembly converts LOX to gas and directs its flow at a controlled rate.

4-4. CONFIGURATION.

4-5. The Liquid Oxygen Converter Assembly, Type GCU-24/A, P/N 10C-0016-10A, consists of a sphere assembly, buildup and vent valve, relief valve, pressure closing valve and associated tubing and fittings. A capacitance-type probe assembly, which sends an electrical signal to a liquid oxygen quantity gage located in the aircraft, is incorporated within the sphere assembly. The quantity gage indicates the amount of LOX, in liters, contained in the converter.

4-6. FUNCTION.

4-7. Operational characteristics and performance for which the GCU-24/A converter assembly (P/N 10C-001610A) are designed are as follows:

1. Filling the converter is accomplished by attaching the LOX servicing trailer filler valve to the filler port of the fill, buildup and vent valve on the converter. When attached, the servicing trailer filler valve depresses the nosepiece and valve poppet of the fill, buildup and vent valve. This automatically puts the converter into the fill mode (figure 4-2).

2. With the poppet depressed, the fill and vent ports of the valve are opened, and the buildup port is closed. This condition allows gas pressure built up in the inner sphere to vent to the atmosphere. As pressure is vented, LOX in the servicing trailer (which is at a greater pressure (30 psig)), flows through the fill, buildup and vent valve and into the converter.

3. As the LOX level rises in the sphere, pressure created by vaporization of liquid due to heat, turbulence, etc, is vented to the atmosphere. The converter is considered full when LOX flows in a steady stream from the overboard vent line quick-disconnect.

4. When the converter is full and the servicing trailer filler valve is disconnected, the nosepiece and poppet of the fill, buildup and vent valve return to the extended position (figure 4-3). This automatically puts the converter into the buildup and supply mode by closing the fill and vent ports of the valve, and opening the buildup port.

5. In the buildup and supply mode (figure 4-3), LOX is forced out of the bottom of the inner sphere and into the buildup coil by the weight of the liquid. As the LOX warms and vaporizes into gaseous oxygen in the buildup coil, pressure is created. This pressure is controlled at approximately 75 psig by the opening and closing action of the pressure closing valve.

6. Gaseous oxygen travels from the buildup coil through the supply quick-disconnect and the heat exchanger to a shut-off valve in the aircraft cockpit.

7. Gaseous oxygen, under pressure, also passes through the gas and buildup ports of the fill, buildup and vent valve to the upper portion of the pressure closing valve, within which is a bellows. This bellows holds the valve in the open position. As pressure builds, the bellows, which senses the increase, contracts (at approximately 75 psig), and closes the valve.

8. Without a demand being placed on the converter, pressure continues to slowly rise. If allowed to go unchecked, pressure in excess of 12,000 psig could be generated. To prevent this potentially hazardous situation, a relief valve is incorporated. The relief valve is set to relieve excess pressure in the converter assembly at approximately 110 psig. As an added safety factor, a burst disc has been installed at the gas port of the fill, buildup, and vent valve (figure 4-2). The burst disc is designed to rupture at 225 psig at 72°F to relieve excess pressure in the event of relief valve or other related converter malfunction.

9. As a demand is placed on the converter by the aircrewmember, LOX is forced into the buildup coil to replace consumed oxygen. As this process is repeated, the LOX level in the converter drops, increasing the void area at the top. As the size of the void area increases, pressure decreases, and is sensed by the bellows in the pressure closing valve. When pressure falls below approximately 75 psig, the bellows expands, opening the valve. With the valve open, pressure from the buildup coil passes through the valve and into the top of the converter. This pressure, compound with the pressure created by vaporizing LOX contained in the converter, again builds to approximately 75 psig and closes the pressure closing valve. This process is repeated as long as a demand is being placed on the converter.

10. A heat exchanger is incorporated into the aircraft tubing to further warm the gaseous oxygen to a breathable temperature.

11. An additional relief valve, set at approximately 115 psig, is installed in the aircraft oxygen plumbing to provide additional protection against over pressurization of the converter and supply lines of the system.

4-8. SERVICE LIFE.

4-9. Liquid oxygen converters shall remain in service as long as they continue to function properly.

4-10. REFERENCE NUMBERS, ITEMS AND SUPPLY DATA.

4-11. Section 4-5, Illustrated Parts Breakdown, contains information on the converter assembly, subassemblies and component parts. Figure and index numbers, reference or part numbers, description, and units per assembly are provided with the breakdown.

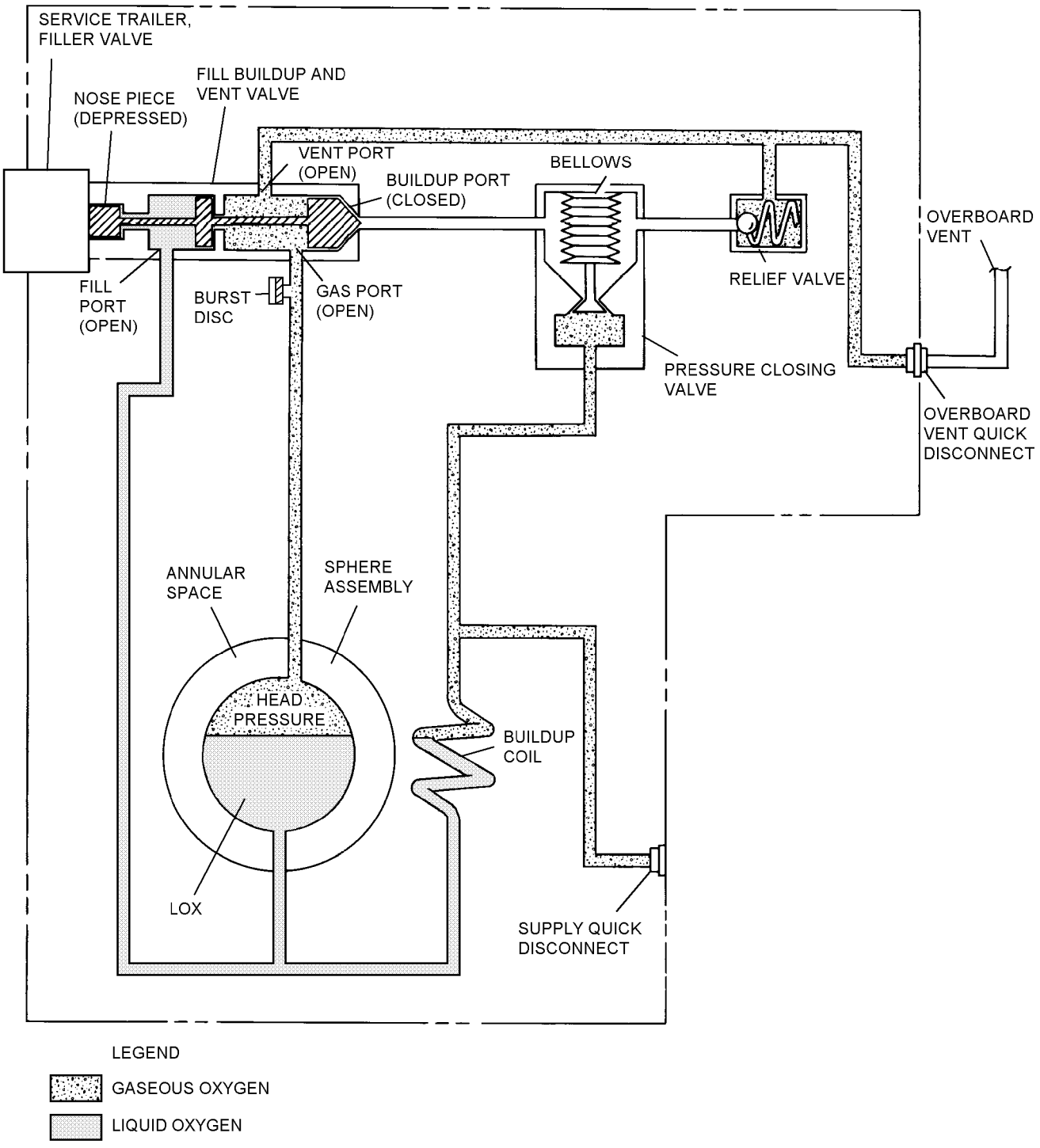

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Figure 4-2. Fill Mode (Converter Removed from Aircraft)

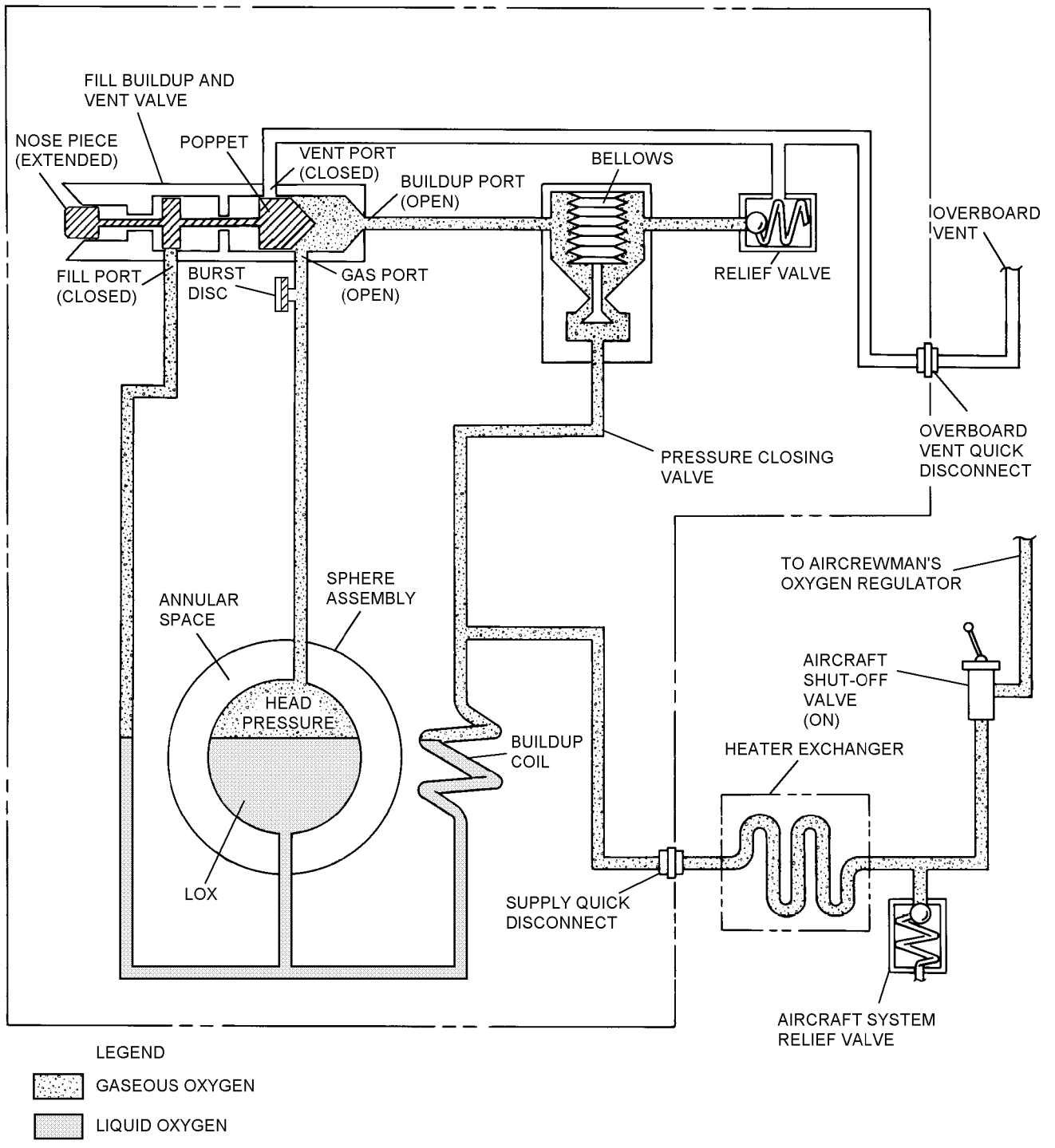

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Figure 4-3. Buildup and Supply Mode (Converter Installed)

Section 4-2. Modifications

4-12. GENERAL.

4-13. Aircrew Systems Change No. 476 is incorporated to document the installation of Burst Disc Assembly 10C-0016-0061 as an added safeguard against over pressurization of Liquid Oxygen Converter (P/N 10C-0016-10A).

Section 4-3. Performance Test Sheet Preparation

4-14. GENERAL.

4-15. Preparation of the Liquid Oxygen Converter Performance Test Sheet (figure 4-4) utilized during bench test requires entering the appropriate indicated flows and pressures in the spaces provided. The indicated flows and pressures shall be extracted from the test stand calibration correction cards. Refer to appropriate ground support equipment manual.

4-16. The test stand calibration correction cards contain all actual flows and pressures required to test all known models of liquid oxygen converters presently in service. Converting actual flows and pressures to indicated flows and pressures is normally accomplished during calibration of the test stand. Refer to appropriate ground support equipment manual for calibration intervals.

4-17. The Performance Test Sheet shall be prepared as shown in figure 4-4. The Performance Test Sheet shown is a sample, but may be reproduced for local use.

4-18. The following tests require the extraction of appropriate indicated flows and/or pressures from the test stand calibration correction cards:

1. Relief Valve Test
2. Converter Leakage Test
3. Fill and Buildup Time Test
4. Flow Test
5. Converter Charge

NOTE

For correction card numbers refer to appropriate ground support equipment manual.

4-19. CONVERTER PERFORMANCE TESTS.

4-20. RELIEF VALVE TEST. The relief valve shall vent at least 100 liters per minute (lpm) with an applied pressure of 100 to 120 psig. The maximum allowable leakage with 95 psig applied is 0.01 lpm. Make the following entries on the Performance Test Sheet:

1. Locate the indicated inches of water (inH_2O) for 100 lpm on correction card number 4. Enter indicated inH_2O in space provided on Performance Test Sheet.

2. Locate the indicated psig for the actual pressures of 95, 100 and 120 psig on correction card number 2. Enter indicated psig in space provided on Performance Test Sheet.

3. Locate the indicated inH_2O for the actual flow of 0.01 lpm on correction card number 7. Enter the indicated inH_2O in space provided on Performance Test Sheet.

4-21. CONVERTER LEAKAGE TEST. The Converter Leakage Test is performed with the converter pressurized with gaseous oxygen to 95 psig. Locate the indicated psig for the actual 95 psig on correction card number 2. Enter indicated psig in space provided on Performance Test Sheet.

REGULATOR PERFORMANCE TEST SHEET
TYPE GCU-24/A LIQUID OXYGEN CONVERTER ASSEMBLY
(ESSEX CRYOGENICS P/N 10C-0016-10A)

DATE: _____ CONVERTER SERIAL NO: _____ TEST STAND SERIAL NO: _____

OPERATOR: _____ CDI: _____ TARE WEIGHT: _____

1. CONVERTER PURGE (PURGE 30 MINUTES AT 200°F (93°C) TO 250°F (121°C) AND AT 120 PSIG).

2. INSULATION RESISTANCE TEST (EMPTY).

CONNECTION	MINIMUM ALLOWABLE MEGOHMS	READING
A TO B	2.0	
A TO GROUND	1.0	
B TO GROUND	1.0	

3. CAPACITANCE TEST (EMPTY) READING SHALL BE 121.5 TO 125.5 MICROMICROFARADS (UUF) _____

4. RELIEF VALVE TEST

VENT FLOW						LEAKAGE					
INLET PRESS (PSIG)			FLOW			INLET PRESS (PSIG)			FLOW		
ACTUAL	INDICATED	PG-1 READING	ACTUAL (LPM)	INDICATED (INH_2O)	PG-2 READING	ACTUAL	INDICATED	PG-1 READING	ACTUAL (LPM)	INDICATED (INH_2O)	PG-2 READING
100			100			95			0.01		
120											

5. CONVERTER LEAKAGE TEST

95 PSIG ACTUAL = _____ PSIG INDICATED, WITH INDICATED PSIG APPLIED THERE SHALL BE NO LEAKAGE FROM THE PRESSURE CONTROL VALVE, BUILDUP COIL, TUBING AND FITTINGS.

6. FILL AND BUILDUP TIME TEST

A. FILL TIME (MAXIMUM TIME ALLOWED IS 10 MINUTES) _____

B. BUILDUP TIME (MAXIMUM TIME TO BUILDUP TO 55 TO 90 PSIG IS 5 MINUTES) PSIG ACTUAL = _____ PSIG INDICATED TIME REQUIRED FOR BUILUP _____ MINUTES.

7. CAPACITANCE TEST (FULL)

TOTAL CONVERTER WEIGHT	
CONVERTER TARE WEIGHT	
LOX WEIGHT (W)	
2.33 X W + 124.7 = C (MAX)	
2.25 X W + 122.3 = C (MIN)	
READING	
C = CAPACITANCE IN UUF	W = WEIGHT OF LOX IN POUNDS

Figure 4-4. Converter Performance Test Sheet (Sheet 1 of 2)

8. FLOW TEST (120 LPM WHILE MAINTAINING 55 TO 90 PSIG WORKING PRESSURE)

WORKING PRESS. (PSIG)		FLOW (LPM)		PG-1 READING
ACTUAL	PG-1 INDICATED	ACTUAL	INDICATED	
55		120		
90				

9. EVAPORATION LOSS TEST (BUILDUP AND SUPPLY MODE) MAXIMUM ALLOWABLE LOSS OF LOX IN 24 HOURS IS 3.0 LBS.

NOTE: LOX IN CONVERTER MUST BE STABILIZED FOR 1 HOUR PRIOR TO BEGINNING TEST. DO NOT AGITATE CONVERTER DURING 24 HOUR PERIOD.

A. START TIME _____ START WEIGHT _____

B. FINISH TIME _____ FINISH WEIGHT _____

10. EVAPORATION LOSS TEST (VENTED MODE)
MAXIMUM ALLOWABLE LOSS OF LOX IN 24 HOURS IS 5.0 LBS. (PERFORMED ONLY IF CONVERTER FAILS EVAPORATION LOSS TEST IN BUILDUP AND SUPPLY MODE)

A. START TIME _____ START WEIGHT _____

B. FINISH TIME _____ FINISH WEIGHT _____

11. CONVERTER CHARGE (OXYGEN)

PRESSURE (PSIG)		
ACTUAL	INDICATED	READING
25		
30		

Figure 4-4. Converter Performance Test Sheet (Sheet 2 of 2)

4-22. FILL AND BUILDUP TIME TEST. The time required to fill the converter (10 liters) shall not exceed 10 minutes at a filling pressure of 30 psig.

4-23. The time required for the filled converter to build up a working pressure of 55 to 90 psig shall not exceed 5 minutes from time the servicing trailer filler valve is disconnected from converter. Locate indicated psig for the actual psig pressure on correction card number 2. Enter indicated psig in space provided on Performance Test Sheet.

4-24. FLOW TEST. The converter shall be capable of delivering gaseous oxygen at the rate of 120 lpm while maintaining pressure of 55 to 90 psig. Make the following entries on the Performance Test Sheet:

1. Locate the indicated inH_2O for the actual flow of 120 lpm on correction card number 4. Enter indicated inH_2O in space provided on Performance Test Sheet.

2. Locate the indicated psig for actual pressures of 55 and 90 psig on correction card number 2. Enter actual psig in spaces provided on Performance Test Sheet.

4-25. CONVERTER CHARGE. Upon completing the Bench Test, the converter shall be emptied of LOX and pressurized with gaseous oxygen 25 to 30 psig. This prevents moisture from entering the converter during shipment/storage. Locate indicated psig for the actual pressures of 25 and 30 psig on correction card number 2. Enter indicated psig in spaces provided on Performance Test Sheet.

Section 4-4. Maintenance

4-26. GENERAL.

4-27. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, repair, assembly, and adjusting of the Liquid Oxygen Converter Assembly Type GCU-24/A (P/N 10C-0016-10A).

NOTE

Upon completion of any maintenance action (e.g., inspection, repair, modification, etc), be sure to complete the required Maintenance Data Collection System forms.

4-28. EMERGENCY PRESSURE RELIEF PROCEDURES.

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-D5-46
1	Fixture, TestValve, Gage/Relief, Pressure	Fabricate IAW figure 4-6
1	Line, Drain, Port, Vent	Fabricate IAW figure 4-7

WARNING

LOX in a non-vented container will build to 12,000 psig. Converters, however, will explode at approximately 1,200 psig. When filling the converter, or at any time, if any of the following situations are encountered, heavy frosting, icing, or excessive pressure buildup (in excess of 130 psig), perform the following steps immediately.

Do not attempt to relieve pressure in LOX converters that indicate critical over pressurization (figure 4-5). For these converters, comply with procedures as prescribed in the individual station/ships emergency procedures bill.

1. After filling is completed, attach pressure gage/relief valve test fixture (figure 4-6) to supply quick disconnect coupling (16).

2. Attach vent port drain line (figure 4-7) to converter vent port coupling (37). Ensure vent port drain line faces away from operator.

3. Ensure adapter knurl knob is backed out counterclockwise.

WARNING

When performing step 4, if excessive pressure does not relieve through vent port drain line, immediately comply with procedures as prescribed in the individual station/ships emergency procedures bill.

4. Install adapter to the fill port of fill, buildup, and vent valve (43) and relieve pressure from the converter by turning the knurl knob of the adapter clockwise four full turns (this places the converter in the vented mode).

5. Observe the pressure gage/relief valve test fixture until 70 psig is indicated.

6. Remove pressure gage/relief valve test fixture and adapter.

WARNING

When performing step 7, if LOX fails to drain from the converter disconnect LOX converter drain line, attach adapter to fill, buildup, vent valve (43) and turn knurl knob clockwise 4 full turns. (Organization level transport defective converter to AIMD immediately.)

7. Immediately place converter in a LOX drain pan, attach LOX converter drain line (figure 4-8) to supply quick-disconnect coupling (16) and drain LOX from the converter.

8. Organizational level forward the defective LOX converter to AIMD for bench test.

4-29. INSPECTION.

WARNING

At any time when filling, inspecting or testing the LOX converter and any of the following situations are encountered; heavy frosting, icing, excessive pressure build-up (in excess of 130 psig) or critical over-pressurization, immediately comply with the emergency pressure relief procedures given in paragraph 4-28 at the beginning of this section.

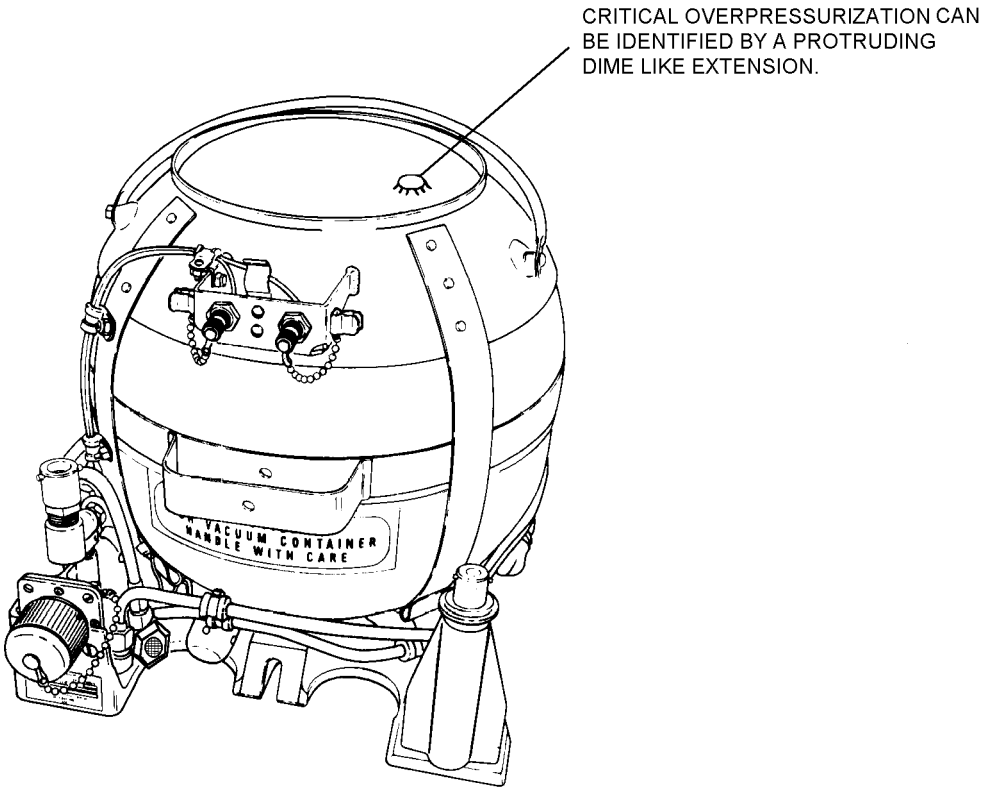

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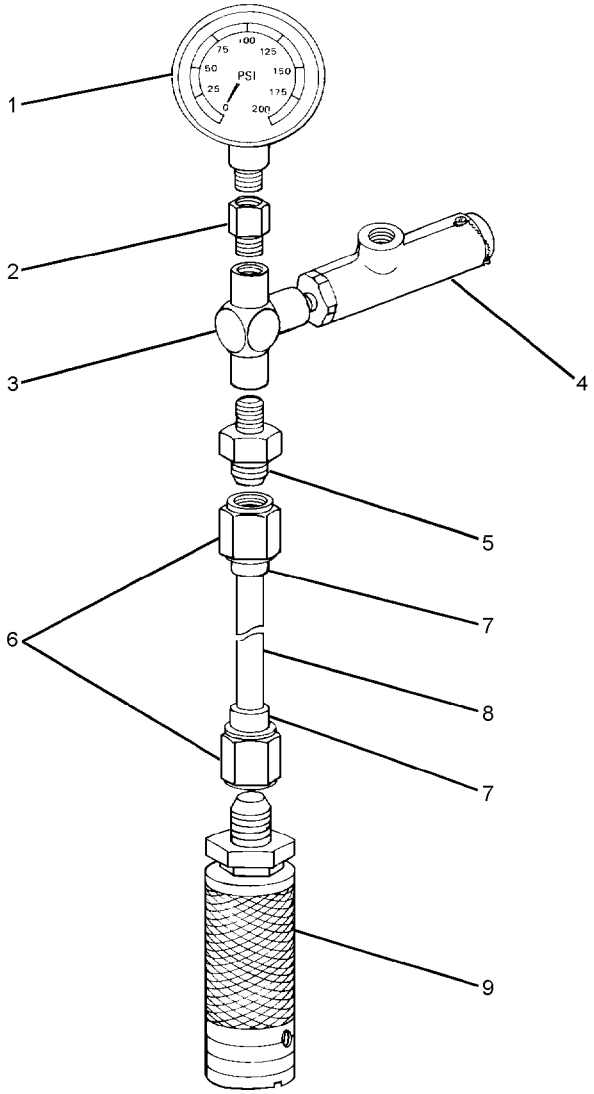
Figure 4-5. Critically Overpressurized Essex LOX Converter, P/N 10C-0016-10A



ITEM NO.	DESCRIPTION	REFERENCE NUMBER	ASSEMBLY
1	200 PSI Oxygen Gage	P/N 100204-18 (CAGE 42527) NIIN 00-961-1990	Anti-seize tape required (Note 1)
2	1/4 to 1/8 in. Reducer, Pipe	P/N 3200X4X2 (CAGE 79470)	Anti-seize tape required
3	Pipe Tee	AN917-1	—
4	Relief Valve	P/N 20C-0005-20 (CAGE 19062) MIL-V-9050D P/N 20C-0050-2	Adjust to relieve at 135 ± 5 psig and flow a minimum of 100 lpm (Note1). Anti-seize tape required
5	Male Connector	AN816-5D	Anti-seize tape required
6	Tubenut	AN818-5	2 required
7	Tube Sleeve	MS20819-5	2 required
8	Flared Aluminum 6061-T6 Tube (5/16″ O.D. Dia)	—	Cut length 2 1/2 to 3 1/2 in.
9	Supply Quick-disconnect Coupling	MS22608-7 P/N 199000-1 (CAGE 83533)	—
Notes:	1. The Pressure Gage/Relief Valve Test Fixture shall be forwarded to AIMD for relief valve setting, flow test, and leakage test (same as converter relief valve test only higher setting). The 200 PSIG Oxygen Gage shall be calibrated in accordance with the metrology and calibration (METCAL) program.		

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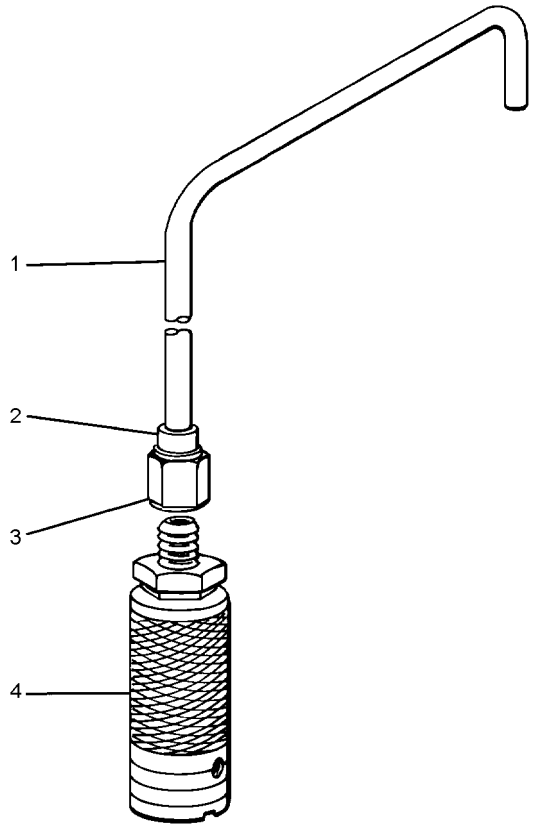
Figure 4-6. Pressure Gage/Relief Valve Test Fixture



ITEM NO.	DESCRIPTION	REFERENCE NUMBER	ASSEMBLY
1	Flared Aluminum 6061-T6 Tube (1/2 O.D. Dia)	—	Cut to 14-inches; bend as shown above
2	Tube Sleeve Coupling	MS20819-8	—
3	Tubenut	AN818-8	—
4	Half Coupling Quick-disconnect	2560000-1 (CAGE 83533)	—

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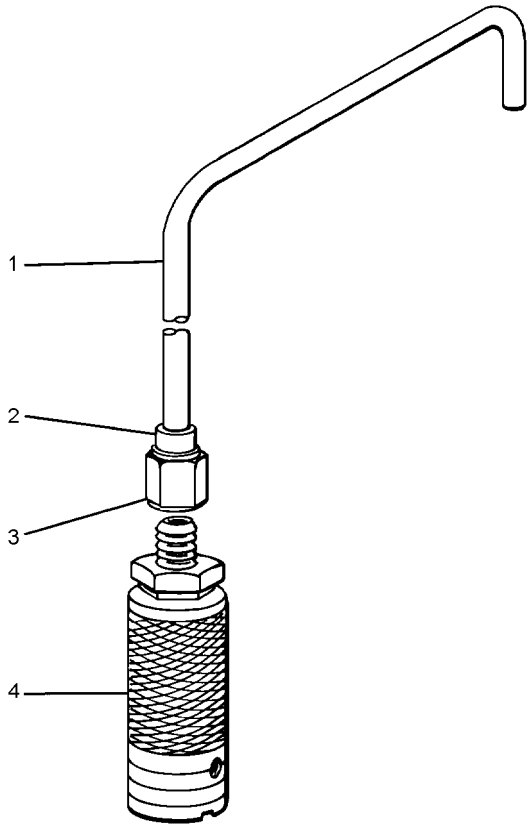
Figure 4-7. Vent Port Drain Line



ITEM NO.	DESCRIPTION	REFERENCE NUMBER	ASSEMBLY
1	Flared Aluminum 6061-T6 Tube (5/16″ O.D. Dia)	—	Cut to 14-inch length; bend as desired
2	Tube Sleeve	MS20819-8	—
3	Tubenut	AN818-5	—
4	Quick-disconnect Coupling	MS22068-7 P/N 199000-1 (CAGE 83533)	—

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Figure 4-8. LOX Converter Drain Line

4-30. ACCEPTANCE/TURNAROUND/DAILY/PRE-FLIGHT/POSTFLIGHT AND TRANSFER INSPECTIONS. The Acceptance/Turnaround/Daily/Pre-flight/Postflight and Transfer Inspections consist of a Visual Inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the converter is installed. Refer to table 4-2 for troubleshooting assistance.

NOTE

Fill the converter in accordance with paragraph 4-48; ensuring strict compliance with all steps, especially steps 5 and 6.

4-31. Any liquid oxygen converter which does not pass the Visual Inspection or Functional Test shall be removed from the aircraft, drained immediately, and replaced by a Ready For Issue (RFI) liquid oxygen converter. To drain the liquid oxygen converter, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Line, Drain, Converter, LOX	Fabricate IAW figure 4-8

NOTE

If no LOX converter drain line is available, fabricate one in accordance with figure 4-8.

1. Place converter in LOX converter drain pan in an area free from dirt and hydrocarbons.

WARNING

Ensure that draining LOX is directed away from all personnel.

2. Attach drain line (figure 4-8) to converter supply quick-disconnecting, which will immediately begin draining converter.

3. Contact Maintenance Control for action to be taken.

4-32. Visual Inspection. Visually inspect the converter assembly and surrounding area for the following:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

1. Freedom from dirt and hydrocarbons.

2. Correct installation and positioning of all components.

3. Presence and condition of safety wire and Glyptal dots on relief valve and pressure closing valve.

4. Legibility of all markings.

5. Cracks, dents, or other damage to tubing, valves, and electrical connections.

6. Corrosion on converter assembly and surrounding areas.

7. Obstructions in aircraft overboard vent line.

8. Security of supply, vent and electrical quick-disconnects.

9. Excessive frosting and/or continuous venting of converter assembly.

10. Ensure that date on converter bench test decal is current (within last 231 days).

4-33. Functional Test. To functionally test the converter assembly and aircraft oxygen system, proceed as follows:

NOTE

The Functional Test should also be performed whenever a component of the aircraft oxygen system is removed/replaced.

1. Ensure that all circuit breakers associated with the LOX quantity indicating system are set.

NOTE

External electrical power must be applied to the aircraft to perform steps 2 and 3.

Refer to applicable aircraft Handbook of Maintenance Instructions (HMI) to determine at what quantity (indicated on quantity gage) that low warning light should illuminate.

2. Depress oxygen test switch. Check quantity gage and low warning light for proper operation.

3. Release test switch. Ensure that gage pointer returns to position registered on gage before depressing. When test is completed, disconnect electrical power from aircraft.

4. Ensure that oxygen shut-off valve is in OFF position.

5. Attach an oxygen mask, regulator, and regulator-to-seat kit hose assembly to oxygen supply connection in aircraft.

6. Turn oxygen shut-off valve to ON position. There should be a flow of oxygen through the mask.

NOTE

Resistance during exhalation is due to the positive pressure feature of the regulator.

7. Place mask against face and breathe. There should be a slight resistance during exhalation.

8. Upon completion of functional test, turn oxygen shutoff valve to OFF. Disconnect regulator-to-seat kit hose from aircraft supply connection.

4-34. If discrepancies are found or suspected, Maintenance Control shall be notified.

4-35. Components of the aircraft oxygen system which do not pass inspection and cannot be repaired in the aircraft shall be removed and replaced by Ready For Issue (RFI) components. Forward defective components to AIMD for Bench Test.

4-36. CALENDAR INSPECTION. The Calendar Inspection shall be performed on all liquid oxygen converters that incorporate a quick disconnect mounting plate prior to placing in service, and at intervals not exceeding 231 days thereafter. This interval applies to all converters; aircraft-installed, shop spares, and those maintained in a servicing pool.

4-37. The Calendar Inspection consists of a Visual Inspection followed by a Bench Test. All work shall be performed in a clean, dust-free and oil-free area. Converter assemblies found to be damaged or out of adjustment shall be repaired by replacing or adjusting the discrepant part or parts. After repair, repeat the Bench Test.

NOTE

Liquid oxygen converters new from supply, manufacture, or from NARF overhaul do not require the bench test decal. The bench test decal shall be placed on the converter by the local AIMD when the converter is placed in service and after each Bench Test.

4-38. Visual Inspection. Inspect the converter assembly in accordance with table 4-3.

4-39. Liquid oxygen converters failing the Visual Inspection or Bench Test (paragraph 4-44) shall be repaired, if specific repair is authorized. SM&R codes, define repairable components and levels of maintenance authorized to perform repairs. Further explanation is found in Naval Aviation Maintenance Program Manual, OPNAVINST 4790.2 Series.

4-40. BENCH TEST.

WARNING

At any time when filling, inspecting or testing the LOX converter and any of the following situations are encountered; heavy frosting, icing, excessive pressure build-up (in excess of 130 psig) or critical over-pressurization, immediately comply with the emergency pressure relief procedures given in paragraph 4-28 at the beginning of this section.

Table 4-2. Troubleshooting (Acceptance/Turnaround/Daily/Preflight/Postflight and Transfer Inspections)

Trouble	Probable Cause	Remedy
Converter will not fill.	Ice in filler valve or filler obstructs LOX flow.	Thaw filler valve or filler line.
Converter does not fill in required time.	Filler line not properly purged prior to filling.	Purge and cool filler line.
	Converter not sub-cooled before filling.	Lower pressure in servicing trailer and sub-cool converter.
	Filling pressure too low.	Set fill pressure in accordance with servicing trailer operating instructions.
	Defective converter.	Replace converter with RFI converter.
Frost collects on entire outer jacket of converter.	Heat loss due to annular space leakage.	Replace converter with RFI converter.
Converter will fill only partially (gas only emitted from vent).	Converter not sub-cooled prior to filling.	Lower pressure in servicing trailer and sub-cool converter.
System will not build up.	Buildup, vent and filler valve defective or partially open.	Replace converter, or thaw valve.
	Pressure relief valve open.	Replace converter with RFI converter.
Oxygen supply consumed too quickly.	Converter not completely filled during filling operation.	Refill converter.
	System leakage.	Locate and repair leaks.
	Buildup, vent and filler valve partially open, venting gas.	Replace converter with RFI converter.
Filler line cannot be disconnected from filler valve.	Filler nozzle frozen to filler valve.	Thaw nozzle.
Low, or no system pressure.	System leakage.	Locate and repair leaks.
	Pressure closing valve out of adjustment.	Replace converter with RFI converter.
Quantity gage indicates empty.	System empty; defective probes or gage.	Refill converter; replace converter or gage.
LOX system contaminated.	Undesirable odors, or moisture.	Purge system.

Table 4-3. Visual Inspection of Type GCU-24/A Liquid Oxygen Converter, P/N 10C-0016-10A

Part Nomenclature	Index Number	Inspect For	Remedy
Note: Index numbers in this table refer to figure 4-15.			
Identification and performance plates.	-1 and -3	Legibility, condition and security.	Secure in place or replace.
Warning and bench test decals.	-5 and -6	Presence and condition.	Replace or apply as required.
Handle.	-7	Bends and cracks.	Replace.
Tubing assemblies.	-12, -23, -29, -32, -35, and -73	Cracks, dents, nicks, scratches, twists and proper clearance. Damaged connectors and tube nuts.	Replace damaged tubing assemblies and connectors. Tubing may be slightly bent to maintain a minimum 1/16-inch clearance between other converter components.
Elbows and nipples.	All	Cracks, dents and scratches.	Replace.
Male quick-disconnects.	-16 and -37	Visible damage.	Replace.
Supply manifold assembly.	-17	Visible damage.	Replace.
Fill buildup and vent valve.	-43	Cracks, damaged poppet valve, nosepiece or worn helical grooves.	Replace.
Clamps.	All	Security and condition.	Tighten or replace.
Pressure relief and pressure closing valve.	-49 and -50	Cracks or other visible damage. Presence and condition of Glyptal dots. Presence and condition of safety-wire.	Perform bench test.
Mounting strap, mounting cradle and mounting base assembly.	-37, -67, and -78	Cracks, broken welds, chipped paint or other visible damage.	Replace. Restore finish by painting (paragraph 4-61).
Sphere assembly.	-77	Evidence of over pressurization (dime like protrusion) excessive dents, chipped paint or other damage.	Refer to paragraph 4-61 for size of acceptable dents. Restore finish by painting (paragraph 4-61).
Converter assembly.	No Index	Freedom from dirt, hydrocarbons and corrosion.	Clean (paragraph 4-57) and/or refinish (paragraph 4-61).
Burst disc.	-31	Cracks, dents, ruptures, or other damage.	Replace (paragraph 4-71).

NOTE

Some in-service liquid oxygen converter test stands that bear part numbers other than those mentioned in paragraph 4-41 or covered in appropriate ground support equipment manual still exist. Use of these test stands is authorized provided they are capable of monitoring converter performance as specified in the Bench Test.

4-41. The Bench Test shall be performed using Liquid Oxygen Converter Test Stand P/Ns 59A120, 31TB1995-1, 1455AS100-1 or 31TB1995-4. Refer to appropriate ground support equipment manual for identification of test stand controls and indicators referenced in Bench Test procedures. Do not attempt to perform any Bench Test without first becoming thoroughly familiar with the test stand (refer to appropriate ground support equipment manual). Utilize Performance Test Sheet (figure 4-4) when performing Bench Test.

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible material. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

When using leak detection compound, carefully avoid getting it on probe wire connections as moisture will cause incorrect capacitance/insulation reading.

NOTE

Tests are arranged so they proceed from one test to the next with a minimum of flow changes. Troubleshooting tables are provided following each test.

4-42. TARE WEIGHT. To find the Tare Weight of the complete converter assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Scale (At Least 50-lb Capacity)	Fed Spec AAA-S-108D or equivalent

NOTE

Tare weight is the weight of the complete converter assembly less the weight of the LOX.

1. Ensure all LOX has been removed from the converter.

2. Place converter assembly on scale of at least 50-lb capacity. Record weight in space provided on Performance Test Sheet.

4-43. CONVERTER ASSEMBLY PURGE. To purge the converter assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-D5-46
1	Coupling, Quick-disconnect, Half	256000-1 MS22068-8 (CAGE 83533)
1	Expander, Thread, Screw, Bushing	AN894-8-4
1	Line, Drain, Converter, LOX	Fabricate IAW figure 4-8
1	Purging Unit, Gas/LOX, Model A/M26M-3	3447AS100-1

WARNING

Use only oil-free nitrogen, Type I, Class I, Grade B for purging LOX converters.

Purging unit model A/M26M-3 has two specially designed 3500 psig nitrogen cylinders. Do not substitute these cylinders with other nitrogen cylinders such as NAN cart cylinders.

While operating purging unit A/M26M-3, protective gloves must be worn by operator. Discharge fittings and hoses can reach temperatures that will cause burns if grasped with bare hands.

NOTE

Personnel operating purging unit model A/M26M-3 should be thoroughly familiar with all valves and controls prior to operating. Refer to appropriate support equipment manual. Personnel operating purging unit model A/M26M-3 shall be licensed in accordance with OPNAVINST 4790.2 series.

Liquid oxygen converters shall be emptied of all LOX and allowed to warm to ambient temperature prior to purging.

Index numbers in parentheses for LOX converter assembly refer to figure 4-15.

Index numbers for purging unit model A/M26M-3 refer to figure 4-9.

1. Remove two supply lines (14) from purge unit cabinet. Connect one end of each supply line (14) to nitrogen supply cylinders and the other ends to the supply inlet connections (22) of purge unit.

2. Remove insulated hose (15) from purge unit cabinet. Connect quick disconnect (18) of insulated hose (15) to system (A) quick disconnect (19) of purge unit.

3. Screw boss to pipe fitting (AN894-8-4) onto quick disconnect coupling and attach to B-nut (23) of insulated hose (15).

4. Turn purge unit 3-way valve (20) to system (A) position.

5. Ensure power switch (5) is OFF.

6. Remove power cable (17) from purge unit cabinet and plug into 110 volt outlet.

7. Open both nitrogen supply cylinder valves.

8. Open hand shutoff valves (1) and (3). High pressure gage (4) will indicate nitrogen supply cylinder pressure.

9. Connect quick disconnect coupling (P/N 256000-1), attached to insulated hose (15), to LOX converter vent port of fill, build up, and vent valve (43).

10. Attach adapter to fill port of LOX converter fill, build up, and vent valve (43). Turn knurl knob of adapter clockwise until it seats, then back off counterclockwise two (2) full turns. This will place the fill, build up, and vent valve half way between the fill/vent and build up/vent modes.

11. Attach LOX converter drain lines (figure 4-8) to LOX converter supply quick disconnect coupling (16).

12. Turn power switch (5) to ON position. Power on light (6) should illuminate.

13. Turn pressure regulator (11) clockwise until 120 psig is indicated on low pressure gage (2).

NOTE

For LOX converters that show indications of internal probe short, it may be necessary to purge the converter for a longer period of time when performing step 14.

14. Observe heater on light (7). When light cycles from on to off, purge the converter for 30 minutes, with a minimum discharge temperature of 90°F.

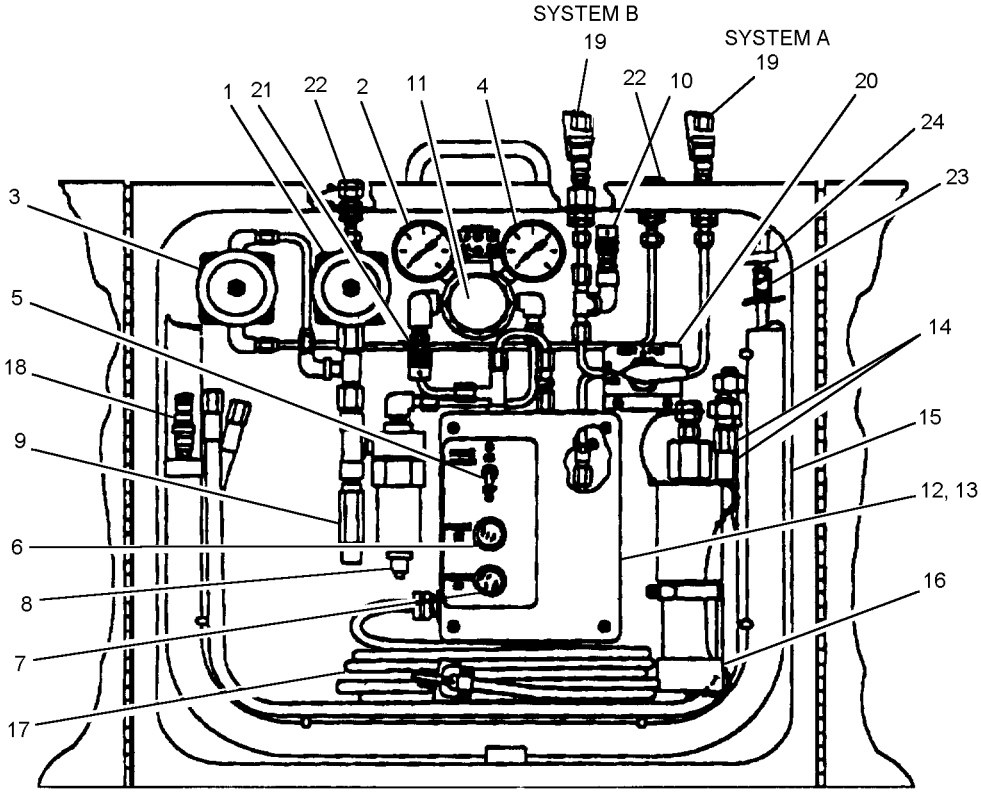
15. When purging is completed, turn purging unit power switch (5) to off.

16. Close nitrogen supply cylinder valves.

17. Observe low pressure gage (2) and high pressure gage (4) until they indicate 0 psig. Back out counterclockwise on pressure regulator (11).

18. Close hand shutoff valves (1) and (3).

19. Disconnect insulated hose (15) from LOX converter vent port fitting of fill, build up, and vent valve (43) and purging unit system (A) quick disconnect (19).



Description	Function
1. Hand Shutoff Valve	Controls Supply Gas Flow
2. Low Pressure Gage	Indicates Delivery Gas Pressure (0-200 PSIG)
3. Hand Shutoff Valve	Controls Supply Gas Flow
4. High Pressure Gage	Indicates Supply Gas Pressure (0-4000 PSIG)
5. Power Switch	Master On/Off Switch/Circuit Breaker
6. Power On Light	Indicates Master Switch is On and Set is Operational
7. Heater On Light	Indicates Operation of Heater
8. Priority Valve	Stops Gas Flow When Supply Gas Pressure Falls Below 200 PSIG
9. Relief Valve	Relieves Supply Pressure Exceeding 3750 PSIG
10. Low Pressure Relief Valve	Relieves Service Line Supply Pressure Exceeding 705 PSIG
11. Pressure Regulator Assembly	Regulates Pressure to 0-200 PSIG
12. Temperature Control Switch (Under Plate)	Cycles Off and On to Control Exit Gas
13. High Temperature Shutdown (Under Plate)	Shuts Off Heater when Heater Block Temperature Reaches 285°F
14. Supply Line	Connects Supply Cylinders to Housing Assembly
15. Insulated Hose Assembly	Connects Housing Assembly
16. Filler Valve	Connects Insulated Hose Assembly to Converter
17. Power Cable	Connects Unit to Electrical Power
18. Quick Disconnect	Connects Insulated Hose to 19 System A or B
19. Quick Disconnect	Connection for Insulated Hose to 19 System A or B
20. 3-Way Valve	Selects A or B Outlet Ports
21. High Pressure Relief Valve	Relieves Service Line Supply Pressure Exceeding 1355 PSIG
22. Supply Pressure Inlet	Connects Supply Line 14 to Purge Unit
23. B-Nut	Connects Insulated Hose to Filler Valve 16 or Adapter (Not Shown)
24. Adapter	Connects Insulated Hose to P-3 Aircraft Filler Port

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Figure 4-9. A/M26M-3 Purging Unit

20. Remove drain lines (figure 4-8) from LOX converter supply quick disconnect coupling (16).

21. Remove adapter from filler port of fill, build up, and vent valve (43).

22. Stow all lines and accessories and secure from purging.

4-44. INSULATION RESISTANCE TEST (EMPTY). To perform the Insulation Resistance Test, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Cable Assembly, Stand, Test	59A120-B5-32-2
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1

NOTE

Prior to proceeding, it should be noted that the minimum acceptable megohm readings have been changed as follows. Between A to B, 2.0 megohms; between A to ground and B to ground the reading shall not be less than 1.0 megohm. These readings are acceptable as long as the converter passes the Capacitance Test (Empty) and Capacitance Test (Full).

1. Secure empty converter in rack provided on test stand counter top.

2. Using test stand cable assembly (figure 4-10), connect upper terminals of high and low capacitance cable assemblies (65 and 66, figure 4-15) to terminals A and B of liquid oxygen quantity gage capacitance type tester.

3. Turn power switch ON and allow tester to warm up 10 minutes prior to proceeding.

4. Turn MEGOHMMETER RANGE SELECTOR to X-1 position.

5. Turn FUNCTION SELECTOR knob from A to B position. Record reading in space provided on Performance Test Sheet. Reading should not be less than 2.0 megohms.

6. Turn FUNCTION SELECTOR knob from A TO GROUND and B TO GROUND positions, respectively. Record readings in spaces provided on Performance Test Sheet. Readings shall not be less than 1.0 megohm in either position.

NOTE

If insulation resistance readings are acceptable proceed to step 11.

7. If insulation resistance readings are less than allowed, connect cable (figure 4-11) to lower probe terminals, and repeat steps 5 and 6.

8. If readings are acceptable, replace low or high capacitance cable assemblies (65 and 66, figure 4-15) as required. Repeat steps 5 and 6. If readings are acceptable, proceed to step 11.

9. If readings continue to be less than acceptable, moisture may still be present in sphere assembly. Purge converter in accordance with paragraph 4-43 and repeat test.

10. Converter assemblies that fail the Insulation Resistance Test and cannot be corrected by replacing low/high capacitance cable assemblies or by purging, shall be forwarded to the next higher maintenance repair facility.

11. Leave all connections unchanged.

4-45. CAPACITANCE TEST (EMPTY). To perform the Capacitance Test, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Cable Assembly, Stand, Test	59A120-B5-32-2
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1

1. Turn CAPACITANCE RANGE SELECTOR knob to X-10 position.

2. Turn FUNCTION SELECTOR knob to CAPACITANCE (UUF) position.

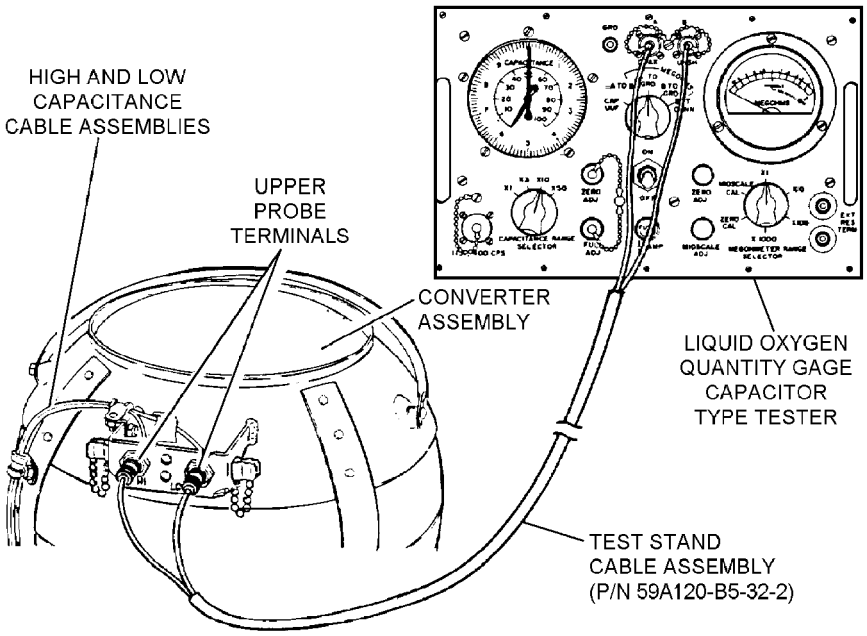

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Figure 4-10. Capacitance/Insulation Resistance Test Hook-up Upper Probe Terminals

3. Record reading in space provided on Performance Test Sheet. Reading shall be 121.5 to 125.5 micromicrofarads (μμF). If reading is acceptable, proceed to step 7.

4. If reading is not within limits, connect test stand cable assembly (figure 4-11) to lower probe terminals of high and low capacitance cable assemblies, and repeat steps 1 through 3.

5. If reading is acceptable in step 4, capacitance cables are defective. Replace high and low capacitance cable assemblies (65 and 66, figure 4-15). Connect test stand cable assembly to upper probe terminals and repeat steps 1 through 3.

6. If reading is still not within limits in step 4, moisture may still be present in sphere. Purge converter in accordance with paragraph 4-43, and repeat Capacitance Test.

NOTE

Converters that fail the Capacitance Test and cannot be corrected by replacing capacitance cables or purging shall be forwarded to the next higher maintenance repair facility.

7. Secure power to tester and disconnect test stand cable assembly from converter and test stand.

4-46. RELIEF VALVE TEST. To perform the Relief Valve Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Glyptal	1201B (CAGE 24452)

Support Equipment Required

Quantity	Description	Reference Number
1	Hose Assembly, Stand, Test	59A120-B5-14
1	Hose Assembly, Stand, Test	59A120-B5-52
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1

NOTE

Index numbers in parentheses refer to figure 4-15.

1. Disconnect low and high capacitance cable assemblies (65 and 66) from lower probe terminals.

2. Hold 45° elbows (36) with open end wrench to prevent turning while loosening tube nut connections. Disconnect buildup tube assembly (35) from buildup port of fill, buildup, and vent valve (43) and from pressure closing valve (50).

3. Cap 45° elbow (36) in buildup port of fill, buildup, and vent valve (43).

4. Using test stand hose assembly (P/N 59A120-B5-14), connect test stand BELL JAR BOTTOM COUPLING (C-1) to the 45° elbow (36) on converter pressure closing valve (50).

5. Using test stand hose assembly (P/N 59A120-B5-52), connect converter quick disconnect coupling (37) to test stand FLOWMETER connection (NIP-4).

6. Turn FLOWMETER SELECTOR valve (V-1) to the 0-150 lpm position. Open TEST PRESSURE GAGE-TO-BELL JAR valve (V-2).

CAUTION

Open OXYGEN SUPPLY valve (V-6) slowly and observe TEST PRESSURE gage (PG-1) and flowmeter PG-2 when applying pressure to the converter. Damage to test stand gages could result from rapid surges in pressure.

7. Slowly open OXYGEN SUPPLY valve (V-6) until 100 lpm flow is indicated on FLOWMETER INDICATOR gage (PG-2).

8. With 100 lpm indicated on FLOWMETER INDICATOR gage (PG-2), reading on test pressure (PG-1) shall be 100-120 psig. Record reading from TEST PRESSURE gage (PG-1) and FLOWMETER INDICATOR gage (PG-2) on Performance Test Sheet.

9. Using OXYGEN SUPPLY valve (V-6) and SYSTEM BLEED valve (V-5), reduce pressure applied to converter to 95 psig as indicated on TEST PRESSURE gage (PG-1).

10. Disconnect test stand hose (P/N 59A120-B5-52) from FLOWMETER connection (NIP-4).

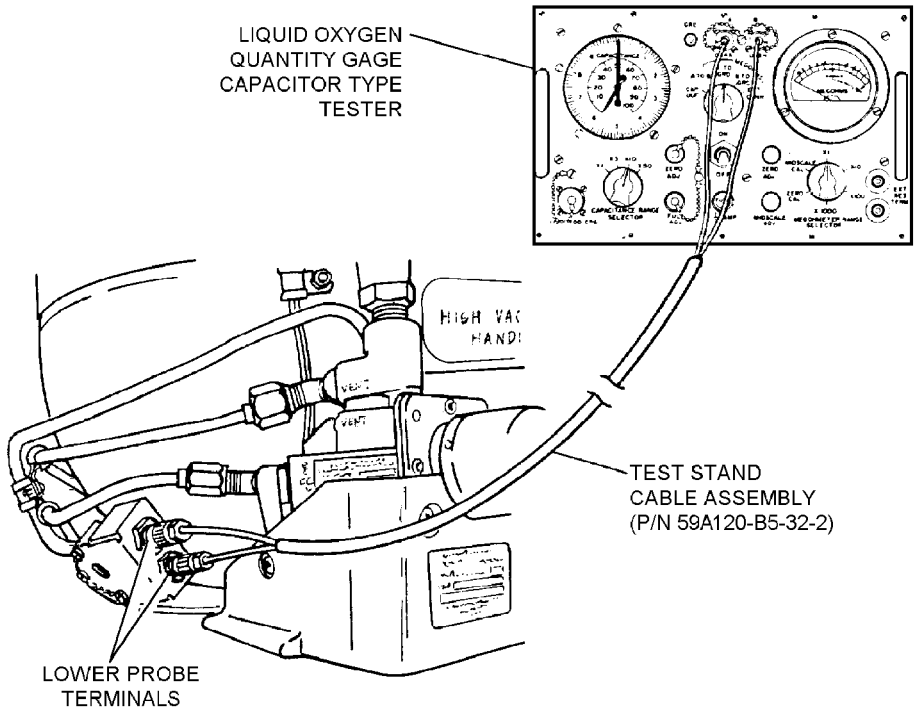


Figure 4-11. Capacitance/Insulation Resistance Test Hook-up Lower Probe Terminals

CAUTION

When attaching test stand hose (P/N 59A120-B5-52) to FLOWMETER connection (NIP-1) attach slowly while observing FLOWMETER INDICATOR gage (PG-2) excessive relief valve leakage could damage FLOWMETER INDICATOR gage (PG-2).

11. Turn FLOWMETER SELECTOR valve (V-1) to the 0.0-0.25 lpm position and slowly connect test stand hose (P/N 59A120-B5-52) to FLOWMETER connection (NIP-1).

12. While maintaining 95 psig to the converter with OXYGEN SUPPLY valve (V-6), check for leakage indicated on FLOWMETER INDICATOR gage (PG-2). Maximum allowable leakage is 0.01 lpm. Record reading on Performance Test Sheet.

13. If leakage is excessive, or if relief valve fails to vent at required flow and pressure, locate probable cause using troubleshooting chart (table 4-4).

14. Apply Glyptal dots to safety wired setscrews.

15. Close OXYGEN SUPPLY valve (V-6). Bleed test stand using SYSTEM BLEED valve (V-5). Close TEST PRESSURE GAGE-TO-BELL JAR valve (V-2).

16. Disconnect test stand hose assemblies (P/Ns 59A120-B5-14 and 59A120-B5-52) from converter and from test stand.

17. Uncap 45° elbow capped in step 3, and reconnect buildup tube (34) removed in step 2.

18. Reconnect high and low capacitance cable assemblies (65 and 66) removed in step 1.

4-47. CONVERTER LEAKAGE TEST. To perform the Converter Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-D5-46
1	Hose Assembly, Stand, Test	59A120-B5-14
1	Coupling, Quick-disconnect (Female)	199000-1 MS22068-7
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1

NOTE

Index numbers in parentheses refer to figure 4-15.

1. Connect quick-disconnect coupling to test stand hose assembly.

2. Using hose assembly, connect test stand BELL JAR BOTTOM COUPLING (C-1) to converter quick disconnect coupling (16).

3. Open TEST PRESSURE GAGE-TO-BELL JAR valve (V-2).

CAUTION

Open OXYGEN SUPPLY valve (V-6) slowly when applying pressure to the converter. Damage to test stand gages could result from rapid surges in pressure.

4. Utilizing OXYGEN SUPPLY valve (V-6) apply 95 psig as indicated on TEST PRESSURE gage (PG-1) to converter.

5. Maintain 95 psig and inspect for leakage at all connections using leak detection compound. There is no allowable leakage. If leakage is indicated, locate probable cause using troubleshooting chart, table 4-5.

Table 4-4. Troubleshooting (Relief Valve Test)

Trouble	Probable Cause	Remedy
Relieving below 100 psig.	Relief valve out of adjustment.	Adjust in accordance with paragraphs 4-65, 66, and 67.
Relieving above 120 psig.	Relief valve out of adjustment.	Adjust in accordance with paragraphs 4-65, 66, and 67.
Relief valve fails to vent 100 lpm.	Relief valve out of adjustment.	Adjust in accordance with paragraphs 4-65, 66, and 67.
Leakage in excess of 0.01 lpm.	Relief valve out of adjustment.	Adjust in accordance with paragraphs 4-65, 66, and 67.
Relief valve cannot be adjusted to tolerances.	Defective parts.	Replace relief valve.

Table 4-5. Troubleshooting (Converter Leakage Test)

Trouble	Probable Cause	Remedy
Any fitting connection leaking.	Loose connection.	Tighten connection.
Elbow or nipple fitting leaking.	Stripped threads, excessive burrs, deep scratches, inside or outside diameter out of round or loose.	Tighten or replace fitting(s).
Tubing leaking.	Dents, kinks, deep scratches, twisted tubing, improperly flared ends or damaged connectors.	Replace tubing.

6. Close OXYGEN SUPPLY valve (V-6). Disconnect hose assembly installed in step 2 from converter quick disconnect coupling (16) and apply leak detection compound to converter supply quick disconnect coupling (16).

7. Bleed test stand using SYSTEM BLEED valve (V5). Close TEST PRESSURE GAGE-TO-BELL JAR valve (V-2).

8. Using adapter, bleed pressure from the converter.

9. Remove converter assembly from test stand.

4-48. FILL AND BUILDUP TIME TEST. To perform the Fill and Buildup Time Test, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Line, Drain, Port, Vent	Fabricate IAW figure 4-7

WARNING

Because of the extreme low temperature of LOX, use extreme care at all times when handling LOX. Ensure prescribed protective clothing is worn, and all safety precautions are observed (Chapter 3).

Ensure venting LOX is directed away from all personnel in the area.

NOTE

Personnel servicing LOX converters and operating LOX transfer equipment shall be qualified and licensed in accordance with OPNAVINST 4790.2 Series.

To perform this test it will be necessary to take the converter to a LOX servicing area, or use a LOX servicing trailer in the immediate area of the Oxygen Shop. Any other method is acceptable that meets requirements of the test, and does not violate safety precautions outlined in Chapter 3.

1. Connect the converter to the servicing trailer.

NOTE

If servicing trailer being used is not the closed loop type, attach a vent port drain line (figure 4-7) to the vent port coupling (37). Ensure vent port drain line is attached to route venting LOX away from all personnel.

2. Note the time, and fill the converter, following applicable instructions for specific ground support equipment servicing trailer being used.

3. When the converter is full, note the time. Time required to fill the converter shall not exceed 10 minutes. Record fill time in space provided on Performance Test Sheet.

4. Note the time and disconnect and secure the servicing trailer (remove the vent port drain line if installed). Time noted is beginning of Fill and Buildup Time Test.

NOTE

The test pressure gage relief valve test fixture shall be forwarded to the Intermediate Maintenance activity every 6 months for pressure gage calibration and relief valve adjustment and leakage test.

5. Immediately after servicing, attach pressure gage/relief valve test fixture (figure 4-6) to converter supply quick-disconnect coupling (16) and observe for 5 minutes; the following actions should occur:

a. The converter should begin to build head pressure as indicated on the pressure gage/relief valve test fixture. Initially the converter will build a pressure that will cause the LOX converter relief valve to relieve (110 to 120 psig). This action may occur twice.

WARNING

When performing step 5b., if pressure fails to stabilize, drain the LOX converter and forward to Intermediate Level maintenance.

b. After step 5a occurs, pressure indication on the pressure gage/relief valve test fixture should stabilize at LOX converter pressure closing valve setting of 55 to 90 psig (a slight fluctuation of 2 to 3 psig on the pressure gage/relief valve test fixture will be present).

6. Disconnect pressure gage/relief valve test fixture from supply quick-disconnect coupling.

7. If converter fails to build head pressure, converter relief valve fails to relieve between 110 to 120 psig, or converter fails to stabilize between 55 to 90 psig, refer to troubleshooting chart (table 4-6).

8. Remove pressure gage/relief valve test fix installed in step 5.

4-49. CAPACITANCE TEST (FULL). To form the Capacitance Test, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Cable Assembly, Stand Test	59A120-B5-32-2
1	LOX Converter Test Stand	59A120 or 21TB1995-1 or 31TB1995-4 or 1455AS100-1
1	Scale (At Least 50-lb Capacity)	Fed Spec AAA-S-108D or equivalent

NOTE

This test requires simultaneous use of the 50 lb capacity scale and the quantity gage capacitance type tester incorporated in the test stand. Ensure that scale is positioned close enough to tester.

1. Place full converter on a scale of at least 50-lb capacity.

2. Using test stand cable assembly (figure 4-10), connect upper terminal of converter high and low capacitance cable assemblies (65 and 66, figure 4-15) to terminals A and B of liquid capacitance type tester.

3. Turn power ON and allow tester to warm up 10 minutes before proceeding.

4. Turn CAPACITANCE RANGE SELECTOR knob to 10X position.

5. Turn FUNCTION SELECTOR knob to CAPACITANCE (UUF) position.

6. Enter total weight of full converter in space provided on Performance Test Sheet (figure 4-4).

7. Enter Tare Weight of converter in space provided on Performance Test Sheet.

NOTE

If the weight of the LOX in the converter is 24 pounds 4 ounces, 24 pounds 8 ounces, and etc.; the ounces must be converted to decimal.

Example

24 lb 4 oz = 24-4/16 lbs

24-4/16 lbs = 24.25 lbs

Enter 24.25 on the Performance Test Sheet.

8. Subtract Tare Weight of converter from total weight. Enter this figure on Performance Test Sheet. This is weight of LOX in converter.

9. Calculate the capacitance maximum (C-max) by multiplying the weight of the LOX (W) by 2.33, and adding 124.7 to the result (2.33(W) + 124.7 = C-max). Enter the result in the space provided on the Performance Test Sheet.

10. Calculate the capacitance minimum (C-min) by multiplying the weight of the LOX (W) by 2.25, and adding 122.3 to the result (2.25(W) + 122.3 = C-min). Enter the result in space provided on Performance Test Sheet.

11. Observe and record capacitance reading from test stand capacitance gage in space provided on Performance Test Sheet. Reading shall be between minimum and maximum established in steps 9 and 10.

12. If reading is not within limits, connect test stand cable assembly (figure 4-11) to lower probe terminals of high and low capacitance cable assemblies and repeat steps 3 through 11.

13. If the test is within limits replace the cable assemblies (65, 66, figure 4-15) and repeat steps 1 through 11.

14. If test is not within limits and converter has not been purged in previous tests, there must be moisture in the sphere. Purge converter in accordance with paragraph 4-43, refill with LOX, and repeat steps 1 through 11.

Table 4-6. Troubleshooting (Fill and Buildup Time Test)

Trouble	Probable Cause	Remedy
Converter fails to build head pressure.	Converter fill, buildup, and vent valve failed to return to build-up and supply mode.	Forward converter to AIMD for purge or valve replacement and Bench Test. Drain converter by removing the tube assembly (index number 29, figure 4-15). Place converter upside down in drain pan and allow to drain by gravity flow process.
Converter relief valve fails to relieve between 110 to 120 psig.	Converter relief valve out of adjust ment or defective.	Forward converter to AIMD for relief valve adjustment or replacement and Bench Test.
Converter pressure continues to build and will not stabilize.	Converter pressure closing valve defective.	Forward converter to AIMD for pressure closing valve replacement and Bench Test.

NOTE

If capacitance reading is still not within limits, the converter shall be forwarded to the next higher maintenance repair facility.

15. Secure tester and disconnect cable (figure 4-10) from converter and tester. If converter passes Capacitance Test, carefully remove converter from scale.

4-50. FLOW TEST. To perform the Flow Test, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-D5-46
1	Hose Assembly, Stand, Test	59A120-B5-12
1	Hose Assembly, Stand, Test	59A120-B51
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1

1. Secure converter in rack provided on test stand counter top.

2. Using test stand hose assembly (P/N 59A120-B5-12), interconnect test stand FLOWMETER connection (NIP-4) to CONVERTER SUPPLY OUTLET connection (NIP-5).

3. Using test stand hose assembly (P/N 59A120-B51), connect test stand SUPPLY-TO-CONVERTER connection (NIP-6) to converter quick-disconnect coupling (16, figure 4-15).

4. Place test stand FLOWMETER SELECTOR valve (V-1) in 0-150-lpm position. Open TEST PRESSURE GAGE BUILD-UP AND FLOW valve (V-10).

NOTE

If TEST PRESSURE gage (PG-1) reads above 90 psig, attach fill vent adapter (P/N 59A120-D5-46) to the fill, buildup, and vent valve. Vent converter system pressure to 70 psig by turning knurled knob clockwise.

5. Open test stand CONVERTER SUPPLY FLOW CONTROL valve (V-9) to a flow of 120 lpm as indicated on FLOWMETER INDICATOR gage (PG-2). Flow for a minimum of 5 minutes.

6. While maintaining a 120-lpm flow, the converter shall maintain pressure of 55 to 90 psig as indicated on TEST PRESSURE gage (PG-1). Record pressure in space provided on Performance Test Sheet.

7. If converter supply pressure is not within limits, locate probable cause using troubleshooting chart, table 4-7.

8. Disconnect test stand hose assemblies attached in steps 2 and 3. Close all test stand valves.

9. Remove converter from test stand and allow it to remain undisturbed for 1 hour.

4-51. EVAPORATION LOSS TEST (BUILDUP AND SUPPLY MODE). To perform the Evaporation Loss Test in the buildup and supply mode, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Scale (At Least 50-lb Capacity)	Fed Spec AAA-S-108D or equivalent

1. Gently place converter on scale and record time and converter weight on Performance Test Sheet.

2. Place converter assembly aside and allow it to remain undisturbed for 24 hours.

3. Carefully place converter on scale and record time and weight in spaces provided on Performance Test Sheet. Weight loss in 24 hours shall not exceed 3.0 lb.

4. If weight loss is 3.0 lb or less, and there is no excessive frosting of the sphere assembly, drain LOX from converter and proceed to converter charge, paragraph 4-52. If weight loss is in excess of 3.0 lb or if there is sphere assembly frosting, consult troubleshooting chart, table 4-8, then proceed to paragraph 4-52.

4-52. EVAPORATION LOSS TEST (VENTED MODE). To perform the Evaporation Loss Test in the vented mode, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-D5-46
1	Scale (At Least 50-lb Capacity)	Fed Spec AAA-S-108D or equivalent

NOTE

This test required only if converter fails Evaporation Loss Test in buildup and supply mode. By comparing the weight loss of this test to that recorded during the buildup and supply Evaporation Loss Test, it is possible to determine whether sphere assembly degradation, vacuum loss, fitting leakage, or valve malfunction was responsible for converter failure during the buildup and supply Evaporation Loss Test.

1. With converter still on scale, attach test stand fill valve adapter to fill, buildup, and vent valve on converter.

WARNING

Venting a converter that is in a buildup and supply mode causes a blast of LOX from vent port (figure 4-15, item 36). Ensure that vent blast is directed away from all personnel, and that adequate clothing and facial protection are worn.

2. Turn knurled knob of adapter clockwise until it seats. This will place the converter in the vented mode.

3. After converter stabilizes, record time and weight in space provided on Performance Test Sheet.

4. Place converter aside and allow it to remain undisturbed in the vented mode for 24 hours.

5. At the end of the 24-hour period, carefully place converter on scale.

Table 4-7. Troubleshooting (Flow Test)

Trouble	Probable Cause	Remedy
Converter fails to maintain operating pressure.	Pressure closing valve out of adjustment.	Adjust (paragraph 4-71, step 35), or replace pressure closing valve.

Table 4-8. Troubleshooting (Evaporation Loss Test, Buildup and Supply Mode)

Trouble	Probable Cause	Remedy
Excessive weight loss.	Loss of vacuum in sphere assembly.	BCM converter assembly.
Excessive weight loss (evaporation loss test (buildup and supply mode)).	Excessively leaking valves, tubing, and/or fittings.	Replace valves. Tighten or replace fittings. Repeat converter leakage test (paragraph 4-47).
	Pressure closing valve out of adjustment or defective.	Adjust pressure closing valve in accordance with paragraph 4-71, step 35.
		Replace pressure closing valve.
Frosting of sphere assembly.	Loss of vacuum in sphere.	BCM converter assembly.

6. Record time and weight in spaces provided on performance test sheet. Weight loss in 24 hours shall not exceed 5.0 lbs.

NOTE

A converter that loses 5.0 lbs or less in the vented mode and the weight loss is more than in the buildup and supply mode (see example A) shall be considered an acceptable unit. If the weight loss is more than 5.0 lbs (see example B) or if the weight loss is less than it was in the buildup and supply mode (see example C) locate probable cause using troubleshooting chart table 4-9.

Example A:
Weight loss
buildup and supply mode = 3.5 lbs.
Weight loss vented mode = 4.0 lbs.
Converter is RFI.

Example B:
Weight loss
buildup and supply mode = 4.0 lbs.
Weight loss vented mode = 6.0 lbs.
Locate probable cause
using troubleshooting chart.

Example C:
Weight loss
buildup and supply mode = 4.0 lbs.
Weight loss vented mode = 3.0 lbs.
Locate probable cause
using troubleshooting chart.

7. Remove fill valve adapter installed in step 1.

WARNING

Ensure that all personnel safety precautions are observed during converter drain.

8. Place converter in LOX drain pan and drain converter completely of all LOX.

4-53. CONVERTER CHARGE. To charge the converter, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Coupling, Quick-disconnect (Female)	59A120-B5-14
1	Hose Assembly, Stand, Test	59A120-B5-14
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1

Table 4-9. Troubleshooting (Evaporation Loss Test, Vented Mode)

Trouble	Probable Cause	Remedy
Excessive weight loss (evaporation loss test (vented)).	Loss of vacuum in sphere assembly.	BCM converter assembly.
Weight loss in vented mode is less than buildup and supply weight loss.	Excessively leaking valves, tubing, and/or fittings when unit failed buildup and supply mode evaporation loss test.	Replace valves. Tighten or replace fittings. Repeat converter leakage test (paragraph 4-47).
	Pressure closing valve out of adjustment or defective when unit failed buildup and supply mode evaporation loss test.	Adjust pressure closing valve in accordance with paragraph 4-71, step 35.
		Replace pressure closing valve.
Excessive frosting of sphere assembly.	Loss of vacuum in sphere.	BCM converter assembly.

CAUTION

Upon completion of bench test, converter shall be charged with gaseous oxygen to 25 to 30 psig to prevent entry of moisture and other contaminants during shipment/storage.

1. Secure converter in rack provided on test stand counter top.

2. Connect quick-disconnect coupling to test stand hose assembly.

3. Using hose assembly, connect test stand BELL JAR BOTTOM COUPLING (C-1) to converter quick disconnect coupling (16, figure 4-15).

4. Open TEST PRESSURE GAGE-TO-BELL JAR valve (V-2).

CAUTION

Open OXYGEN SUPPLY valve (V-6) slowly when applying pressure to the converter. Damage to test stand gages could result from rapid surges in pressure.

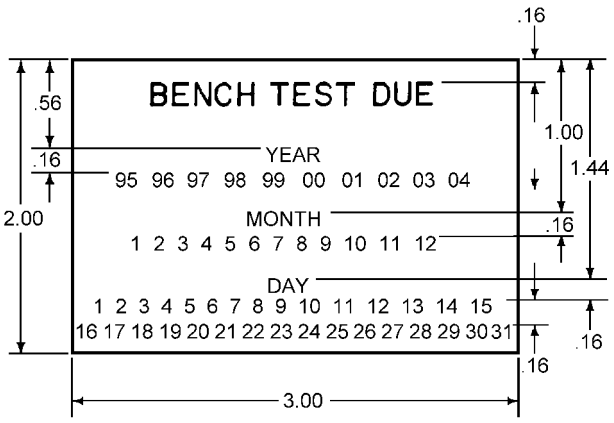
5. Using OXYGEN SUPPLY valve (V-6), charge converter to 25 to 30 psig. Pressure will be indicated on TEST PRESSURE gage (PG-1).

6. Close OXYGEN SUPPLY valve (V-6) disconnect hose assembly connected in step 2 and bleed test stand using SYSTEM BLEED valve (V-5). Secure all test stand valves.

7. Test stand operator and CDI sign Performance Test Sheet. Retain Performance Test Sheet until next scheduled Bench Test is performed.

8. Mark due-date of next Bench Test on bench test decal (figure 4-12). Due date shall be 231 days from last Bench Test date. Affix decal to converter in a position in which it will be visible when converter is installed in aircraft.

9. Annotate station/ship performing Bench Test on a serviceable condition label and affix to bench test decal so as not to interfere with marked due date.



NOTES:

1 MATERIAL SHALL BE ELASTOMERIC PRESSURE SENSITIVE TYPE ADHESIVE BACKED, IN ACCORDANCE WITH MIL-M-43719, TYPE I, CLASS 1.
2 ALL LETTERS AND NUMBERS SHALL APPROXIMATELY MATCH GREEN NO. 14187 OF FED. STD. NO. 595; BACKGROUND SHALL APPROXIMATELY MATCH WHITE NO. 17875 OF FED. STD. NO. 595.
3 BENCH TEST DUE SHALL BE 18-POINT GOTHIC (SANS SERIF) LETTERING. ALL OTHER NUMBERS AND LETTERS SHALL BE 10-POINT, GOTHIC (SANS SERIF).

004012

Figure 4-12. Bench Test Decal

NOTE

Bench test decals may be procured from Customer Service at the nearest NARF.

10. Install dust covers or plugs in/on all open couplings prior to shipping or storage of converter.

4-54. DISASSEMBLY.

WARNING

At any time when filling, inspecting or testing the LOX converter and any of the following situations are encountered; heavy frosting, icing, excessive pressure build-up (in excess of 130 psig) or critical over-pressurization, immediately comply with the emergency pressure relief procedures given in paragraph 4-28 at the beginning of this section.

4-55. Disassemble the liquid oxygen converter using index numbers assigned to figure 4-15, unless otherwise noted. Disassemble the converter only as far as necessary to correct any malfunctions. Disassemble the converter as follows:

CAUTION

All disassembly, inspection, repair and assembly must be done on benches having good lighting and in an area provided with air conditioning. Walls, floor and ceiling should have a smooth finish, and be painted with a non-chalking paint which can be kept clean and dust free. It is desirable to keep all parts for each individual LOX converter separated. Make careful note of the location, angle of fitting, and quantity of all parts. Plastic partitioned boxes should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

NOTE

No special tools are required to disassemble, adjust or assemble this converter.

1. Remove two bolts (8), and remove handle (7).

2. Remove handle clamp (9) by removing two nuts (10) and two screws (11).

3. Remove two electrical clips (57) by removing nuts (58) and screws (59). This will free dust cap assemblies (60, 61).

4. Remove one electrical clamp (62) nut (63) and screw (64).

5. Remove three cable clamp assemblies (62) by removing three nuts (63) from mounting cradle assembly (67).

6. Disconnect and remove capacitance cable assemblies (65, 66).

CAUTION

To prevent damage to tube assemblies, hold up fittings (nipples, elbows, etc.) with backup wrench when removing tube nuts. Remove tube assemblies carefully.

7. Remove supply tube assembly (12) by loosening tube nuts at each end.

8. Remove quick-disconnect coupling assembly (16 from supply manifold (17).

9. Remove supply manifold (17) by removing four nuts (18) and four screws (19).

10. Remove two tube clamps (20) by removing nut (21) and screw (22).

11. Remove fill tube assembly (23) by loosening tube nuts.

12. Remove three tube clamps (26) by removing nut (27) and screw (28).

13. Remove vent tube assembly (29), relief tube assembly (32) and buildup tube assembly (35) by loosening tube nuts at each end of each tube.

14. Remove fill buildup and vent valve mounting strap assembly (39) by removing two nuts (40) and screw (41). (One nut is on threaded part of strap (39).)

15. Remove fill, buildup and vent valve (43) by removing two nuts (44) and screws (45).

16. Remove quick-disconnect coupling (37) and vent fitting (38) from combination valve vent port.

17. Remove burst disc (31) from 90° elbow (30).

18. Remove elbows (25) and (30) from two pipe elbows (42). Remove two pipe elbows (42) from gas port and fill port respectively.

19. Remove two 45° elbows (34, 36) from vent fitting (38) and buildup fitting respectively.

NOTE

In order to remove relief valve (49) and pressure closing valve (50), it will be necessary to first remove the sphere (77).

20. Disconnect buildup coil tube (73) at nipple (56) on supply T-assembly (55) by loosening the tube nut.

21. Remove four cradle assembly mounting nuts (68).

22. Carefully remove two forward cradle mounting bolts from converter base, two ferrules (72), two tube clamps (69), and two lock washers (71).

23. Carefully remove two rear cradle mounting bolts from converter base.

NOTE

Ensure that sphere assembly (77) is not damaged in handling.

24. Remove sphere assembly (77). Remove mounting cradle assembly (67) and strap and handle assembly (76).

25. Remove relief valve clamp (46) by removing two nuts (47) and screws (48).

26. Disconnect buildup coil tube (73) by loosening tube nut from nipple (56) on pressure closing valve (50).

27. Remove pressure relief valve (49) and pressure closing valve (50) from mounting base by removing two nuts (51), screw (52), and screw (53). This will free tube clamp (54).

28. Mount pressure closing valve in vise and remove relief valve.

29. Remove tube elbows, nipples, and other fittings as required for replacement.

4-56. CLEANING.

4-57. To clean the disassembled converter, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Wash Bottle	MS36070A
As Required	Bag, Plastic	MIL-B-117
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

1. Clean all metallic parts in accordance with procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free nitrogen.

2. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free nitrogen.

3. After cleaning, surfaces shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

4. Cleaned parts shall be sealed in plastic bags for storage. Bag all complete assemblies that are not immediately returned to service.

4-58. INSPECTION OF DISASSEMBLED PARTS.

4-59. Inspect the disassembled converter and component parts in accordance with table 4-10 and the following special instructions:

1. Inspect all hardware items (nipples, elbows, etc.) for stripped threads, burrs, nicks, distortion, rust, corrosion, or other defects.

Table 4-10. Inspection of Disassembled Parts

Part Nomenclature	Index Number	Inspect For	Remedy
Note: Index numbers in this table refer to figure 4-15.			
Identification and performance plates.	-1 and -3	Legibility, condition and security.	Secure in place.
Warning and bench test decals.	-5 and -6	Presence and condition.	Replace or apply as required.
Handle.	-7	Bends and cracks.	Replace.
Tubing assemblies.	-12, -23, -29, -32, -35, and -73	Cracks, dents, nicks, scratches, twists or damaged connectors and tube nuts.	Replace.
Elbows and nipples.	All	Cracks, dents and scratches.	Replace.
Male quick-disconnects.	-16 and -37	Visible damage.	Replace.
Supply manifold assembly.	-17	Visible damage.	Replace.
Fill buildup and vent valve.	-43	Cracks, damaged poppet valve, nosepiece or worn helical grooves.	Replace.
Clamps.	All	Security and condition.	Tighten or replace.
Pressure relief and pressure closing valve.	-49 and -50	Cracks or other visible damage. Presence and condition of Glyptal dots. Presence and condition of safety-wire.	Perform bench test.
Mounting strap, mounting cradle and mounting base assembly.	-39, -67, and -78	Cracks, broken welds, chipped paint or other visible damage.	Replace. Restore finish by components, painting (paragraph 4-61).
Sphere assembly.	-77	Excessive dents, chipped paint or other damage.	Refer to paragraph 4-61 for size of acceptable dents. Restore finish by painting (paragraph 4-61).
Dust caps.	-60 and -61	Broken chain or caps.	Replace.
Electrical clip.	-57	Any damage.	Replace.
Cable assemblies.	-66 and -66	Abrasions and other visible damage.	Replace.
Burst disc.	-31	Stripped threads or other damage.	Replace.

NOTE

Because of the method of suspension of shock mounting of the inner container, some looseness can be detected in most containers by shaking the converter vigorously. Some models employ a spring type suspension that eventually loses some tension. Others have a nylon type spacer that experiences slight shrinkage. Looseness and rattles become more apparent with age. Some looseness can be detected in many new containers. Looseness or rattles is not a criterion for determining serviceability. The integrity of the container is determined by the 24 hour Evaporation Loss Test.

4-60. REPAIR.

4-61. Repair of the converter assembly is limited to replacing defective components, minor repairs (small dents, scratches, abrasions, nicks, etc) of tubing and sphere assembly, reattachment of pinch-off tube protective cover, and touching-up painted surfaces. To make minor repairs, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	NIIN 00-738-6429
As Required	Bushing, Rubber	AN3420-6A
As Required	Glyptal	1201B (CAGE 24452)
As Required	Lacquer-Cellulose Nitrate, Glass Color 622, Jet Black	MIL-L-7178
As Required	Lockwire	MS20995C20
As Required	Paint, Green, (Color 14187) (Note 1)	—

Notes: 1. Use any available green paint, chip color 14187, approved by local Environmental Protection Agency.

1. Tubing assemblies with minor dents not causing flow restriction are considered serviceable. Small scratches, abrasions, and nicks can be smoothed with a burnishing tool or aluminum wool.

2. To avoid burnishing the same area more than once, each burnished area shall be identified by a painted band. Color and size of bands are as follows:

a. Color bands shall cover an area not less than 2 inches, nor more than 3 inches in length.

b. Green lacquer shall be used on black and aluminum tubing.

c. Black lacquer shall be used on green tubing.

d. If tubing is repainted, reidentify burnished area.

3. Areas found to be susceptible to scratching, abrasions, and nicks may be further protected by splitting a length of rubber bushing and placing it around the effected area. Secure bushing in place by wrapping one turn of lockwire at each end.

4. Tubing nicked, abraded, or scratched in an area previously identified as burnished shall be condemned.

5. Sphere assemblies containing minor dents are considered serviceable, provided the sphere passes the vented evaporation loss test. Normally, dents up to 3/8-inch deep will not affect function of the sphere.

WARNING

When painting converter, ensure that fittings, tubing, and valves are removed or masked prior to painting. Paint and other foreign matter associated with painting introduced into these components could create an explosion hazard when contacting oxygen.

6. Sphere assemblies passing the vented evaporation loss test and having dents shall be identified by painting.

NOTE

Converters that have actually been critically overpressurized will not pass the bench test. The integrity of the annular space has been lost during the critical overpressurization stage. These converters will frost at the dime like protrusion area and the converter will not pass the evaporation loss test.

Prior to replacing pinch-off tube protective cover, an evaporation loss test (vented condition) shall be performed in accordance with paragraph 4-52. This will ensure that the pinch-off tube was not damaged by whatever force loosened the protective cover.

7. Converters that have partial dime like impressions which were caused by rough handling or improper packaging will normally pass the bench test and can be certified RFI. The partial dime like impressions in this case shall be treated as a dent and painted black and the converter returned to service. If the converter happens to overpressurize in the future there will be a frosting on top of the sphere in the area of the painted dot and a dime like protrusion will begin to form.

8. Pinch-off tube protective covers maybe secured back in place over the pinch-off tube as follows:

a. Clean area surrounding pinch-off tube and flange area of protective cover by sanding followed by cleaning area using procedures outlined in NAVAIR 13-1-6.4-1.

b. Mix equal portion of part “A” resin and part “B” activator. Mix thoroughly following instructions provided with adhesive.

c. Apply adhesive to flange of protective cover. Place cover over pinch-off tube, pressing in place to achieve a good bond. Wipe off excess adhesive and allow cover to remain undisturbed for approximately 8 hours.

4-62. ASSEMBLY.

4-63. Assembly of the liquid oxygen converter assembly is essentially the reverse of disassembly. Test and adjustments are required on certain subassemblies as they are assembled to the converter.

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

CAUTION

When installing tubing assemblies, ensure that tubing aligns with fittings to which tube nuts attach. Cross threading should be avoided.

Hold nipples, elbows, tees, etc with backup wrench to avoid twisting or breakage.

4-64. RELIEF VALVE TEST. To test the relief valve on test stand (P/N 59A120) or similar prior to its installation, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Glyptal	1201B (CAGE 24452)
As Required	Lock Wire	MS20995C20

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-B5-8
1	Hose Assembly, Stand, Test	59A120-B5-12
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1

1. Ensure test stand is in secured position.

2. Attach test stand adapter to relief valve.

3. Connect relief valve to test stand BELL JAR BOTTOM COUPLER (C-1).

4. Open test pressure GAGE-TO-BELL JAR valve (V-2).

5. Close system bleed valve (V-5) and differential pressure shutoff valve (V-8) and open supply cylinder.

6. Open OXYGEN SUPPLY valve (V-6) and apply 95 psig to valve assembly as indicated on TEST PRESSURE gage (PG-1). Check for leakage around test relief valve and connector with leak detection compound. Correct any test stand leakage prior to proceeding.

7. Install test stand bell jar over relief valve and secure in place.

8. Using hose assembly, connect BELL JAR TOP COUPLING (C-2) to FLOWMETER connection (NIP-4).

9. Turn FLOWMETER SELECTOR valve (V-1) to 0-150 lpm position.

CAUTION

Open OXYGEN SUPPLY valve (V-6) slowly and observe TEST PRESSURE gage (PG-1) and FLOWMETER INDICATOR gage (PG-2) when applying pressure to the relief valve. Damage to the test stand gages could result from rapid surges in pressure.

10. Slowly open OXYGEN SUPPLY valve (V-6) until 100 lpm flow is indicated on FLOWMETER INDICATOR gage (PG-2).

11. With 100 lpm flow indicated on FLOWMETER INDICATOR gage (PG-2) reading on TEST PRESSURE gage (PG-1) shall be 100 to 120 psig.

NOTE

If reading is not within acceptable limits proceed to paragraphs 4-65, 4-66, or 4-67 for adjustment procedures.

12. Using OXYGEN SUPPLY valve (V-6) and SYSTEM BLEED valve (V-5), reduce pressure applied to relief valve to 95 psig as indicated on TEST PRESSURE gage (PG-1).

13. Disconnect test stand hose from FLOWMETER connection (NIP-4).

CAUTION

When attaching test stand hose to FLOWMETER connection (NIP-1), attach slowly while observing FLOWMETER INDICATOR gage (PG-2), excessive relief valve leakage could damage FLOWMETER INDICATOR gage (PG-2).

14. Turn FLOWMETER SELECTOR valve (V-1) to the 0.00.25 lpm position and slowly connect test stand hose to FLOWMETER connection (NIP-1).

15. Maximum allowable leakage as indicated on FLOWMETER INDICATOR gage (PG-2) shall be 0.01 lpm.

16. Relieve pressure using SYSTEM BLEED valve (V-5).

17. Disconnect hose assembly.

18. Remove bell jar.

19. If relief valve vents properly remove the assembly from test stand and disconnect test stand adapter from relief valve, safety wire and apply Glyptal dot in accordance with figure 4-13. Secure the test stand.

20. If relief valve fails to vent properly, or shows excessive leakage, adjust in accordance with corresponding relief valve Adjustment procedures:

4-65. ADJUSTMENT PROCEDURES (ESSEX RELIEF VALVE P/N 20C-0050-2). Adjustment of the Essex Relief Valve (P/N 20C-0050-2) involves 2 potential adjustments (figure 4-13). The valve can normally be brought into tolerance with the pressure adjustment screw, however adjustment of the spring retainer may be required.

Materials Required

Quantity	Description	Reference Number
As Required	Glyptal	1201B (CAGE 24452)
1	Hexagonal Nut	MS35649-242 or equivalent
As Required	Lockwire	MS20995C20
1	Machine Screw	MS35190-228 or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-B5-8

NOTE

It may be necessary to adjust the minimum (100 psig) relieving pressure to comply with the maximum allowable leakage (0.01 lpm). This is acceptable, provided the valve relieves 100 lpm at 100 to 120 psig.

1. Thread hexagonal nut on machine screw.

2. Thread machine screw/hex nut assembly into pressure adjustment screw approximately four turns.

3. While holding the machine screw with an appropriate screwdriver, tighten down the hexagonal nut with a 1/4 inch wrench.

4. Remove lockwire from lockscrews, remove Glyptal dots by applying a small amount of acetone.

5. Loosen lockscrew (A).

6. If valve relieves below 100 psig, turn pressure adjusting screw counterclockwise. If relieving above 120 psig, turn adjusting screw clockwise. If valve cannot be adjusted to proper limits, a coarse adjustment must be made using the spring retainer.

7. If valve has been adjusted properly, proceed to step 11.

8. Tighten lockscrew (A).

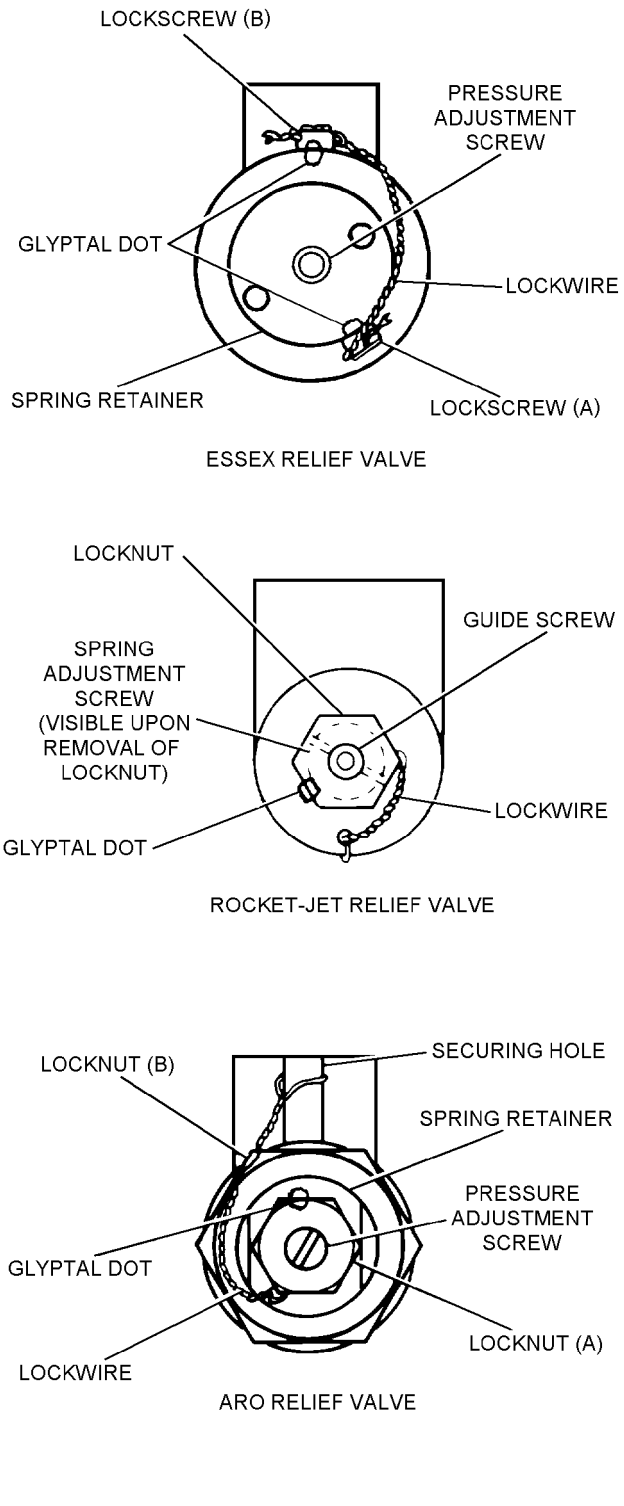


Figure 4-13. Application of Glyptal Dot(s) and Lockwire to Relief Valve

9. Loosen lockscrew (B).

10. If valve relieves below 100 psig, turn spring retainer 1 turn clockwise. If relieving above 120 psig, turn adjusting screw 1 turn counterclockwise. Retighten lockscrew (B). Repeat step 5 and adjust the valve to proper limits. It may be necessary to repeat this step to obtain proper setting. If valve cannot be adjusted to proper limits, it shall be disposed of in accordance with local directives.

11. Tighten both lockscrews.

12. Loosen hex nut and remove the machine screw/hex nut assembly.

13. Retest valve in accordance with paragraph 4-64.

14. Remove valve assembly from test stand and disconnect test stand connector (P/N 59A120-B5-8) from relief valve.

15. Lockwire and apply Glyptal dots in accordance with figure 4-13.

4-66. ADJUSTMENT PROCEDURES (ROCKET-JET RELIEF VALVE P/N 10525-2). Adjustment of the Rocket Jet Relief Valve (P/N 10525-2) involves 3 components of the valve (figure 4-13). The first is a locknut which is used for tightening the complete adjustment assembly. The second is a small guide screw located on the inside of the locknut, which is adjusted using an Allen wrench. This part is not responsible for the performance of the valve. The third part, the spring adjustment screw, adjusts the pressure at which the valve will relieve. It is located under the locknut and can be adjusted by a screwdriver only after removal of the locknut and the guide screw.

Materials Required

Quantity	Description	Reference Number
As Required	Glyptal	1201B (CAGE 24452)
As Required	Lockwire	MS20995C20

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-B5-8

NOTE

It may be necessary to adjust the minimum (100 psig) relieving pressure to comply with the maximum allowable leakage (0.01 lpm). This is acceptable, provided the valve relieves 100 lpm at 100 to 120 psig.

1. Remove lockwire from locknut, remove Glyptal dot by applying a small amount of acetone.

2. Remove locknut using a 3/8-inch wrench.

3. Remove guide screw using a 3/32-inch Allen wrench.

4. If valve relieves below 100 psig, turn spring adjustment screw clockwise with a screwdriver. If valve relieves above 120 psig, turn spring adjustment screw counterclockwise. It may be necessary to repeat this step to obtain proper setting. If spring adjustment screw is removed, teflon tape must be applied to ensure a proper seal. If valve cannot be adjusted to proper limits, it shall be disposed of in accordance with local directives.

CAUTION

Ensure spring adjustment screw does not turn out of adjustment while installing the guide screw and locknut.

5. Reinstall guide screw and turn clockwise until slight resistance is felt (screw bottomed out). Reinstall locknut.

6. Using the Allen wrench, turn the guide screw 2 full turns counterclockwise.

CAUTION

Extreme care should be taken towards keeping the guide screw in its adjusted position when tightening the locknut as deviation from this position could cause the valve not to relieve at any pressure.

7. Tighten the locknut ensuring that the Allen wrench and guide screw are in their adjusted position.

8. Retest valve in accordance with paragraph 4-64.

9. Remove valve assembly from test stand and disconnect test stand connector (P/N 59A120-B5-8) from relief valve.

10. Lockwire and apply Glyptal dot in accordance with figure 4-13.

4-67. ADJUSTMENT PROCEDURES (ARO RELIEF VALVE P/N 21247-1). Adjustment of the ARO Relief Valve (P/N 21247-1) involves 2 potential adjustments (figure 4-13). The valve can normally be brought into tolerance with the pressure adjustment screw, however adjustment of the spring retainer may be required.

Materials Required

Quantity	Description	Reference Number
As Required	Glyptal	1201B (CAGE 24452)
As Required	Lockwire	MS20995C20

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-B5-8

NOTE

It may be necessary to adjust the minimum (100 psig) relieving pressure to comply with the maximum allowable leakage (0.01 lpm). This is acceptable, provided the valve relieves 100 lpm at 100 to 120 psig.

1. Remove lockwire from locknuts, remove Glyptal dot by applying a small amount of acetone.

2. Loosen locknut (A).

3. If valve relieves below 100 psig, turn adjusting screw counterclockwise. If relieving above 120 psig, turn adjusting screw clockwise. If valve cannot be adjusted to proper limits a coarse adjustment must be made using the spring retainer.

4. If valve has been adjusted properly, proceed to step 8.

5. Tighten locknut (A).

6. Loosen locknut (B).

7. If valve relieves below 100 psig turn spring retainer 1 turn clockwise. If relieving above 120 psig, turn adjusting screw 1 turn counterclockwise. Tighten locknut (B). Repeat steps 2 thru 5 and attempt to adjust the valve to proper limits. It may be necessary to repeat this step to obtain proper setting. If valve cannot be adjusted to proper limits, it shall be disposed of in accordance with local directives.

8. Tighten both locknuts.

9. Retest valve in accordance with paragraph 4-64.

10. Remove valve assembly from test stand and disconnect test stand connector (P/N 59A120-B5-8) from relief valve.

11. Lockwire valve from locknut (A) to locknut (B) to securing hole and apply Glyptal dot in accordance with figure 4-13.

4-68. PRESSURE CLOSING VALVE LEAKAGE TEST. To test the pressure closing valve for leakage prior to installation, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Connector Assembly, Test Stand	59A120-C5-18
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1
1	Plug Assembly, Test Stand	59A120-B5-16

NOTE

Index numbers in parentheses refer to figure 4-14.

1. Plug relief valve port (4) with test stand plug assembly.

2. Attach pressure gage to buildup tube port (6).

3. Attach test stand connector assembly to buildup coil port (5).

4. Attach closing valve to BELL JAR BOTTOM COUPLING (C-1).

5. Open TEST PRESSURE GAGE-TO-BELL JAR valve (V-2).

6. Open OXYGEN SUPPLY valve (V-6) and apply 120 psig as indicated on TEST PRESSURE gage (PG-1). Gage attached to buildup tube port (6) should read between 55 and 90 psig.

NOTE

If pressure at buildup tube port does not fall within the 55 to 90 psig limit, adjust pressure closing valve in accordance with paragraph 4-71, step 35.

7. Apply leak detection compound to bellows retainer (3) and valve body. No leakage is allowed. If leakage is noted, replace valve assembly.

8. Ensure that 120 psig is indicated on TEST PRESSURE gage (PG-1). Hold pressure for 5 minutes. Any increase of pressure shown on gage attached to buildup tube port (6) indicates internal leakage and cause for rejection.

9. Close OXYGEN SUPPLY valve (V-6) and bleed test stand using SYSTEM BLEED valve (V-5).

10. Remove pressure closing valve from test stand. Remove plug, gage, and connector from valve. Installation and further adjustments are performed in paragraph 4-71.

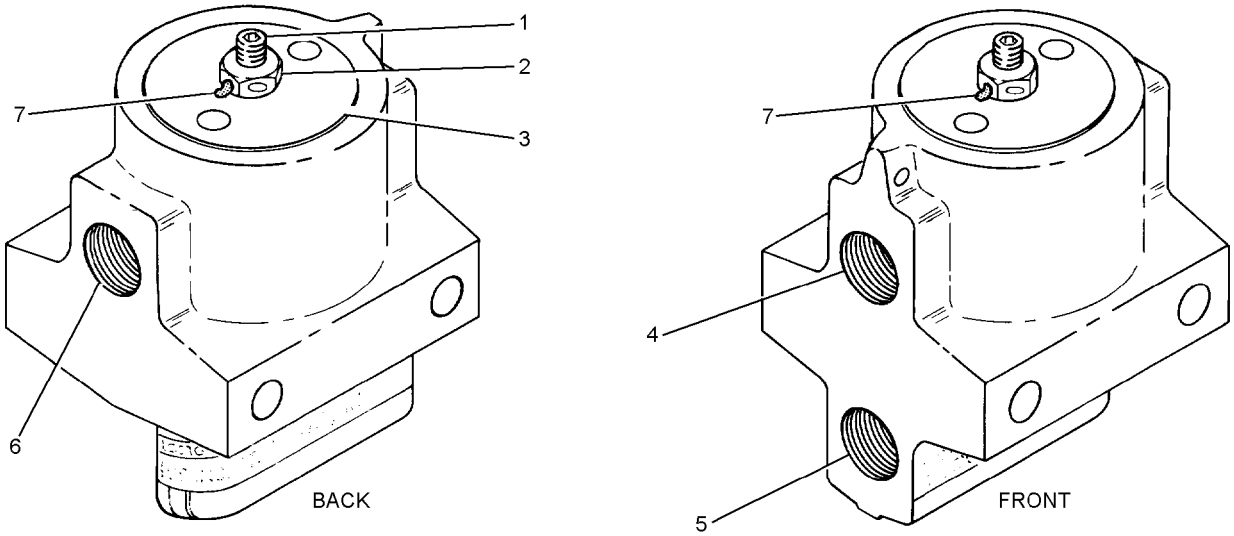
4-69. FILL, BUILDUP AND VENT VALVE TEST. To test the fill, buildup and vent valve for leakage prior to installation, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-B5-8
1	Connector Assembly, Test Stand	59A120-C5-39
1	Hose Assembly, Stand, Test	59A120-B5-12
1	LOX Converter Test Stand	59A120 or 31TB1995-1 or 31TB1995-4 or 1455AS100-1
1	Plug Assembly, Test Stand	59A120-B5-38



1. ADJUSTING SCREW
2. ADJUSTING LOCKNUT
3. BELLOWS RETAINER
4. RELIEF VALVE PORT
5. BUILDUP COIL PORT
6. BUILDUP TUBE PORT
7. GLYPTAL DOT

004014

Figure 4-14. Pressure Closing Valve

1. Plug gas and vent parts of valve using test stand plugs.

2. Attach test stand connector assembly to fill outlet port of valve.

3. Install fill, buildup and vent valve with connector and plugs attached in test stand BELL JAR BOTTOM COUPLING (C-1).

CAUTION

Open OXYGEN SUPPLY valve (V-6) slowly when applying pressure to valve. Damage to test stand gages could result from surges in pressure.

4. Open TEST PRESSURE GAGE-TO-BELL JAR valve (V-2) and close DIFFERENTIAL PRESSURE SHUT-OFF valve (V-8).

5. Open OXYGEN SUPPLY valve (V-6) and apply 70 psig to valve assembly. Check for leakage around test stand plugs and couplings with leak detection compound. Correct any test stand leakage prior to proceeding.

6. Install test stand bell jar over fill, buildup and vent valve, and secure in place.

7. Using test stand hose assembly, interconnect BELL JAR TOP COUPLING (C-2) and FLOWMETER Connection (NIP-1).

8. Turn FLOWMETER SELECTOR valve (V-1) to the 0.0-0.25 lpm position.

CAUTION

When applying pressure in step 9, observe both TEST PRESSURE gage (PG-1) and FLOWMETER INDICATOR gage (PG-2). Excessive leakage could damage FLOWMETER INDICATOR gage (PG-2).

9. Maintain 70 psig to the fill, buildup and vent valve for 2 minutes. Leakage from the fill inlet port, indicated on FLOWMETER INDICATOR gage (PG-2) shall not exceed 0.02 lpm.

10. Close OXYGEN SUPPLY valve (V-6). Bleed pressure from test stand with SYSTEM BLEED valve (V-5).

CAUTION

Ensure pressure is bled from test stand prior to opening DIFFERENTIAL PRESSURE SHUT-OFF valve (V-8). Overpressurization could damage DIFFERENTIAL PRESSURE gage (DF-1).

11. Open DIFFERENTIAL PRESSURE SHUT-OFF valve (V-8).

CAUTION

When applying pressure in step 12, observe both DIFFERENTIAL PRESSURE gage (DF-1) and FLOWMETER INDICATOR gage (PG-2). Excessive leakage could damage FLOWMETER INDICATOR gage (PG-2).

12. Slowly open OXYGEN SUPPLY valve (V-6) to apply 10 inH_2O, as indicated on DIFFERENTIAL PRESSURE gage (DF-1). Maintain pressure for 2 minutes. Leakage, indicated on FLOWMETER INDICATOR gage (PG-2), shall not exceed 0.02 lpm.

13. If leakage in steps 9 or 12 exceeds 0.02 lpm, replace valve.

14. Close OXYGEN SUPPLY valve (V-6). Bleed pressure from test stand SYSTEM BLEED valve (V-5). Close DIFFERENTIAL PRESSURE SHUT-OFF valve (V-8).

15. Remove test stand bell jar. Remove test stand plug from vent port of fill, buildup and vent valve.

16. Place test stand bell jar back in position over fill, buildup and vent valve. Using test stand hose assembly, interconnect bell jar top coupling (C-2) and FLOWMETER connection (NIP-1).

17. Turn FLOWMETER SELECTOR valve (V-1) to the 0.0-0.25 lpm position.

CAUTION

When applying pressure in step 18, observe both TEST PRESSURE gage (PG-1) and FLOWMETER INDICATOR gage (PG-2).

18. Open OXYGEN SUPPLY valve (V-6) and apply 70 psig to valve assembly. Maintain 70 psig to the fill, buildup and vent valve for 2 minutes. Leakage from the vent port indicated on FLOWMETER INDICATOR gage (PG-2) shall not exceed 0.05 lpm.

19. Close OXYGEN SUPPLY valve (V-6). Bleed pressure from test stand with SYSTEM BLEED valve (V-5).

CAUTION

Ensure pressure is bled from test stand prior to opening DIFFERENTIAL PRESSURE SHUT-OFF valve (V-8). Overpressurization could damage DIFFERENTIAL PRESSURE gage (DF-1).

20. Open DIFFERENTIAL PRESSURE SHUT-OFF valve (V-8).

CAUTION

When applying pressure in step 21 observe both DIFFERENTIAL PRESSURE gage (DF-1) and FLOWMETER INDICATOR gage (PG-2). Excessive leakage could damage FLOWMETER INDICATOR gage (PG-2).

21. Slowly open OXYGEN SUPPLY valve (V-6) to apply 10 inH_2O, as indicated on DIFFERENTIAL PRESSURE gage (DF-1). Maintain pressure for 2 minutes. Leakage, indicated on FLOWMETER INDICATOR gage (PG-2), shall not exceed 0.05 lpm.

NOTE

Vent port leakage is determined by subtracting the leakage noted in step 9 from that shown in step 18 and leakage noted in step 12 from that shown in step 21. In either case, leakage from the vent port shall not exceed 0.05 lpm.

22. If leakage in step 18 or 21 exceeds 0.05 lpm, replace valve.

23. Close OXYGEN SUPPLY valve (V-6). Bleed pressure from test stand with SYSTEM BLEED valve (V-5). Close DIFFERENTIAL PRESSURE SHUT-OFF valve (V-8).

24. Remove test stand hose assembly from BELL JAR TOP COUPLING (C-2) and FLOWMETER connection (NIP-1). Remove bell jar.

25. Remove fill, buildup and vent valve from test stand. Remove plug from gas port and connector from fill outlet port of valve. Set valve assembly aside. Installation will be covered later in this section.

4-70. COMPLETION OF ASSEMBLY.

4-71. To complete assembly of converter components, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Anti-seize	MIL-T-27730
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Glyptal	1201B (CAGE 24452)

CAUTION

When installing tube assemblies, ensure fittings to which tube nuts are to be attached are properly aligned with tube to prevent cross threading. Hold connecting fittings with open end wrench to avoid straining or breakage when tightening. Hold tubing away from other components of converter assembly while tightening so that a minimum 1/16 inch clearance is maintained. It may be necessary to slightly bend some tube assemblies to maintain this clearance. Ensure tubing is not crimped after bending process.

Use anti-seize tape on all male pipe thread fittings. Apply single layer of tape, overlapping ends just enough to avoid gap in tape when fitting is installed. To prevent tube blockage, ensure tape is clear of last thread.

Do not use anti-seize tape on flared or straight thread fittings.

NOTE

Index numbers in parentheses refer to figure 4-15.

1. Assemble two pipe elbows (42) into gas and fill ports of fill, buildup and vent valve (43). Install elbows (25) and (30) into pipe elbows (42).

2. Assemble quick-disconnect coupling assembly (37) and elbow (34) into vent fitting (38).

3. Assemble vent fitting (38) to vent port of fill buildup and vent valve (43).

4. Install elbow (36) into buildup port of fill, buildup and vent valve (43).

5. Prior to installing fill, buildup and vent valve (43), leak test assembled elbows as follows:

a. Cap elbow (36) installed in buildup port.

b. Apply 90 psig to gas port of valve. Check for leakage using leak detection compound.

c. Remove cap installed above and apply 90 psig to fill-out port of valve. Check for leakage using leak detection compound.

d. Correct any leakage prior to installation of valve.

6. Install burst disc (31) in 90° elbow (30), install fill, buildup and vent valve (43) on converter mounting base (78). Secure with mounting strap (39), screws (41 and 45) and nuts (40 and 44).

6A. Install cap assembly (P/N MS27566-1) onto fill, buildup, and vent valve (43) and secure to converter mounting base (78) with screw (P/N AN516C6-8) and self-locking nut (P/N MS20365D632).

7. Assemble elbow (36) to pressure closing valve (50), and elbow (33) to pressure relief valve (49).

8. Install relief valve (49) into pressure closing (50). Install nipple (56) into port provided in pressure closing valve (50).

9. Prior assembled relief valve (49) and pressure closing valve (50), leak test assembled elbows and nipple as follows:

a. Cap elbow (36) and apply 90 pi to nipple (56).

b. Check for leakage using leak detection compound.

c. Correct any leakage prior to installation of valves.

10. Attach relief valve (49) and pressure closing valve (50), as a unit, to converter mounting base (78). Secure relief valve with clamp (46), two screws (48) and two nuts (47).

11. Attach pressure closing valve to converter mounting base (78) with machine screw (52) and self locking nut (51).

12. Attach one end of buildup coil (73) to nipple (56) in pressure closing valve (50). Other end of buildup coil will be attached later in this Section.

13. Install tube clamp (54) over buildup coil assembly (73). Secure with machine screw (53) and self-locking nut (51).

14. Attach dust caps (60 and 61) and electrical clips (57) to mounting cradle assembly (67) with two screws (59) and two nuts (57).

15. Attach low capacitance cable assembly (65) and high capacitance cable assembly (66) to mounting assembly (67). Use rubber washer, lockwasher and nut provided with each cable assembly. Place dust covers (60 and 61) over cable terminal.

16. Route low and high capacitance cable assemblies (65 and 66) along mounting cradle assembly (67), securing with electrical clamps (62), screws (64) and self locking nuts (63).

17. Attach converter handle (7) to mounting cradle (67) with two bolts (8). Install handle clamp (9) using two screws (11) and two nuts (58).

18. Place strap and handle assembly (76) over sphere assembly (77). Position just above circumferential seam of sphere, with handle directly above warning decal (5). Secure with nut (74).

19. Place mounting cradle (67) over sphere assembly (77) and attach strap and handle assembly (76). Align mounting cradle so capacitance terminals are directly above handle of strap and handle assembly (76).

20. Attach two nuts (64) and two lock washers (71) to the two forward mounting bolts of the mounting cradle (67).

21. Place two tube clamps (69) on buildup coil (73), and align with holes in forward mounting cradle in converter mounting base assembly (78).

22. Position sphere assembly (77) with attached strap handle (76) and mounting cradle (67) on mounting base assembly (78) so that forward bolts of cradle assembly pass through two tube clamps (69) positioned in step 21, two ferrules (72) and into forward mounting holes in mounting cradle (78). Position aft mounting bolts in holes provided.

23. Secure mounting cradle assembly with four self-locking nuts (68).

24. Attach tube nut at unattached end of buildup coil (73) to nipple (56) in supply tee assembly (55).

25. Attach supply manifold assembly (17) to mounting cradle (78) with four screws (19) and four self-locking nuts (18). Install quick-disconnect assembly (16) into supply manifold assembly (17).

26. Attach buildup tube (35) to elbow (36) in pressure closing valve and elbow (36) in buildup port of fill, buildup and vent valve (43).

27. Attach relief tube (32) to elbow (33) in pressure relief valve and elbow (34) in vent fitting (38).

28. Attach vent tube (29) to converter sphere and to elbow (30) in gas port of fill, buildup and vent valve (43).

29. Attach three tube clamps (26) with screw (28) and self-locking nut (27).

30. Attach fill tube (23) to elbow (25) in fill port of fill, buildup and vent valve (43) and nipple (24) in supply tee assembly (55).

31. Install nipple (13) into port in supply manifold assembly (17).

32. Attach supply tube (12) to nipple (13) in supply manifold assembly and orifice valve (14) in supply tee (55).

33. Install two tube clamps (20), one over fill tube assembly (23) and the other over buildup coil assembly (73). Secure in place using machine screw (22) and self-locking nut (21).

34. After assembly, Bench Test converter in accordance with paragraph 4-40.

35. During post-assembly Bench Test, it may be necessary to adjust pressure closing valve (50) when performing the flow test. If so, proceed as follows:

NOTE

Index numbers in parentheses refer to figure 4-14.

a. Cut and remove lockwire from adjusting locknut (2). Remove Glyptal dot by scraping it with a razor blade.

NOTE

The 70 to 75 psig operating pressure is for adjustment purposes only. If converter maintains 55 to 90 psig, no adjustment is required. If converter pressure is above or below this range, adjust pressure closing valve to maintain 70 to 75 psig.

b. Using an Allen wrench, turn adjusting screw (1) so a supply pressure of 70 to 75 psig is maintained with a flow of 120 lpm. Turning adjusting screw counterclockwise decreases pressure and turning clockwise increases pressure. Flow the converter for at least 15 minutes to ensure pressure is constant.

c. Tighten adjusting locknut (2) and safety-wire, using lockwire (MS20995C20).

d. Apply Glyptal dot (7) to adjusting locknut (2) but not to threads of adjustment screw (1).

Section 4-5. Illustrated Parts Breakdown

4-72. GENERAL.

4-73. This Section lists and illustrates the assemblies and detail parts of the Liquid Oxygen Converter Assembly, Type GCU-24/A, P/N 10C-0016-10A, manufactured by Essex Industries, Inc. (CAGE 83533).

4-74. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

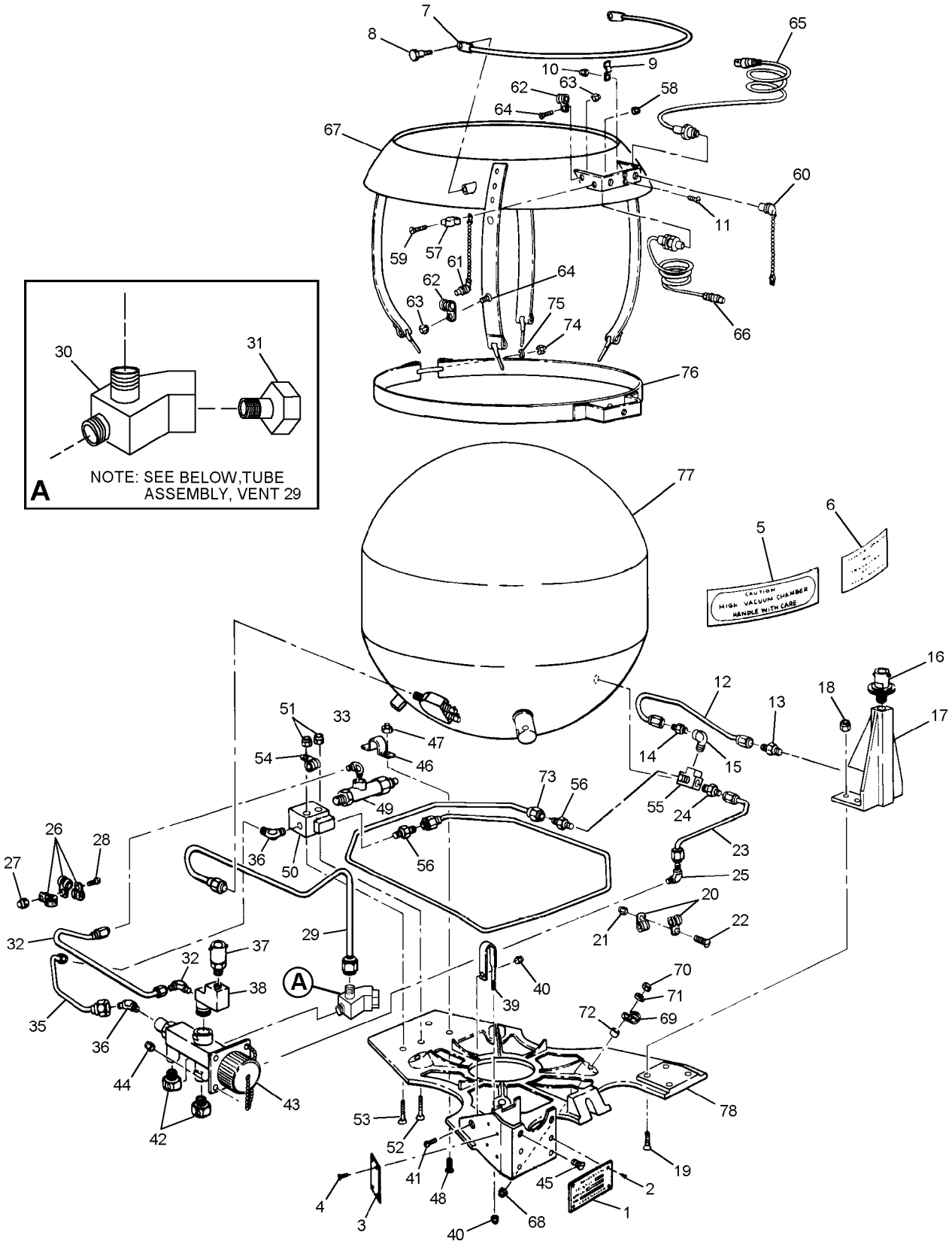


Figure 4-15. Liquid Oxygen Converter, Type GCU-24/A, P/N 10C-0016-10A

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-15	10C-0016-10A	CONVERTER ASSEMBLY, Liquid oxygen, 10 liter (CAGE 83533)	REF	
-1	10C-0016-0020	. PLATE, Identification	1	
		(ATTACHING PARTS)		
-2	AN535-00-2	. SCREW, Drive, Rd. Hd.	4	
		---*---		
-3	10C-0016-0021	. PLATE, Vacuum performance	1	
		(ATTACHING PARTS)		
-4	AN535-00-2	. SCREW, Drive, Rd. Hd.	4	
		---*---		
-5	10C-0001-0033	. DECAL, Warning	1	
-6	CL227C2-1	. DECAL, Bench test date	1	
-7	10C-0016-0009	. HANDLE, Converter	1	
		(ATTACHING PARTS)		
-8	10C-0016-0026	. BOLT, Hex. Hd. Shld., No. 0-32 NF-2A x 5/16	2	
		---*---		
-9	10C-0016-008	. CLAMP, Handle	1	
		(ATTACHING PARTS)		
-10	AN365D632	. NUT, Self-locking	2	
-11	AN515C6-7	. SCREW, Mach., Rd. Hd.	2	
		---*---		
-12	10C-0016-0041	. TUBE ASSEMBLY, Supply	1	
-13	AN816-5D	. NIPPLE	1	
-14	20C-0009-1	. VALVE, Orifice	1	
-15	AN914-1D	. ELBOW, Internal and external pipe thd	1	
-16	528000-4	. COUPLING ASSEMBLY, Quick-disconnect	1	
-17	10C-0016-0002	. MANIFOLD ASSEMBLY, Supply	1	
		(ATTACHING PARTS)		
-18	AN365D1032	. NUT, Self-locking	4	
-19	AN507C1032-14	. SCREW, Mach, Flat Hd.	4	
		---*---		
-20	MS21919DG5	. CLAMP, Tube	2	
		(ATTACHING PARTS)		
-21	AN365D632	. NUT, Self-locking	1	
-22	AN515C6-6	. SCREW, Machine, Rd. Hd.	1	
		---*---		
-23	10C-0016-0038	. TUBE ASSEMBLY, Fill	1	
-24	AN816-5D	. NIPPLE	1	
-25	AN822-5D	. ELBOW 90°	1	
-26	MS21919DG5	. CLAMP, Tube	3	
		(ATTACHING PARTS)		
-27	AN365D632	. NUT, Self-locking	1	
-28	AN515C6-7	. SCREW, Machine, Rd. Hd.	1	
		---*---		
-29	10C-0016-0039	. TUBE ASSEMBLY, Vent	1	
-30	10C-0016-0060	. ELBOW, 90° (CAGE 83533)	1	
-31	10C-0016-0061	. BURST DISC ASSEMBLY (CAGE 83533)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-15-32	10C-0016-0042	. TUBE ASSEMBLY, Relief	1	
-33	AN822-5D	. ELBOW 90°	1	
-34	AN823-5D	. ELBOW, 45°	1	
-35	10C-0016-0040	. TUBE ASSEMBLY, Buildup	1	
-36	AN823-5D	. ELBOW, 45°	2	
-37	256000-8	. COUPLING ASSEMBLY, Quick-disconnect	1	
-38	10C-0016-0019	. FITTING, Vent	1	
-39	10C-0016-0028	. STRAP ASSEMBLY, Mounting (ATTACHING PARTS)	1	
-40	AN365D1032	. NUT, Self-locking	2	
-41	AN520C10-8	. SCREW, Machine, Rd. Hd	1	
-42	10C-0016-0029	. ELBOW, 90° ---*---	2	
-43	439000-3	. VALVE ASSEMBLY, Fill buildup and vent	1	
	0580560100-1	. VALVE ASSEMBLY, Fill buildup and vent (ATTACHING PARTS)	1	
-44	AN365D1032	. NUT, Self-locking	2	
-45	AN507C1032-12	. SCREW, Machine, Flat Hd	2	
-46	10C-0016-0024	. CLAMP, Relief valve (ATTACHING PARTS)	1	
-47	AN365D1032	. NUT, Self-locking	2	
-48	AN507C1032-10	. SCREW, Machine, Flat Hd ---*---	2	
-49	20C-0050-2	. VALVE, Pressure relief (Note 1)	1	
-50	20C-0008-1	. VALVE, Pressure closing (ATTACHING PARTS)	1	
-51	AN365D1032	. NUT, Self-locking	2	
-52	AN507C1032-28	. SCREW, Machine, flat hd	1	
-53	AN507C1032-30	. SCREW, Machine, flat hd ---*---	1	
-54	MS21919DG5	. CLAMP, Tube	1	
-55	10C-0016-0036	. TEE ASSEMBLY, Supply	1	
-56	AN816-5D	. NIPPLE	2	
-57	10C-0001-0034	. CLIP, Electrical (ATTACHING PARTS)	2	
-58	AN365D632	. NUT, Self-locking	2	
-59	AN515C6-7	. SCREW, Machine Rd. Hd. ---*---	2	
-60	10C-0001-0009	. CAP ASSEMBLY, Dust, E polarity (120°)	1	
-61	10C-0001-0008	. CAP ASSEMBLY, Dust, B polarity (180°)	1	
-62	MS21919DG2	. CLAMP ASSEMBLY, Electrical (ATTACHING PARTS)	4	
-63	AN365D632	. NUT, Self-locking	4	
-64	AN515C6-7	. SCREW, Machine Rd. Hd. ---*---	1	
-65	10C-0016-0031	. CABLE ASSEMBLY, Low-capacitance, E polarity	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-15-66	10C-0016-0032	. CABLE ASSEMBLY, High-capacitance, B polarity	1	
-67	10C-0016-0027	. CRADLE ASSEMBLY, Mounting (ATTACHING PARTS)		
-68	AN365D1032	. NUT, Self-locking	4	
		---*---		
-69	MS21919DG5	. CLAMP, Tube (ATTACHING PARTS)	2	
-70	AN345C10	. NUT, Plain	2	
-71	AN935-10L	. WASHER, Lock	2	
		---*---		
-72	10C-0016-0044	. FERRULE	2	
-73	10C-0016-0043	. COIL ASSEMBLY, Buildup	1	
-74	AN365D832	. NUT, Self-locking	1	
-75	AN960C8	. WASHER, Flat	1	
-76	10C-0016-0017	. STRAP AND HANDLE ASSEMBLY	1	
-77	10C-0016-0035	. SPHERE ASSEMBLY	1	
-78	10C-0016-0010	. BASE, Converter mounting	1	
	Notes: 1. Relief valve, P/N 20C-0050-2, P/N 20C-0005-20, P/N 10525-2 (CAGE 97413), and P/N 21247-1 (CAGE 97413), are interchangeable.			

NUMERICAL INDEX

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AN365D632	4-15-10	PAOZZ
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AN365D832	4-15-74	PAOZZ
AN507C1032-10	4-15-48	PAOZZ
AN507C1032-12	4-15-45	PAOZZ
AN507C1032-14	4-15-19	PAOZZ
AN507C1032-28	4-15-52	
AN507C1032-30	4-15-53	PAOZZ
AN515C6-6	4-15-22	PAOZZ
AN515C6-7	4-15-11	PAOZZ
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AN520C10-8	4-15-41	
AN535-00-2	4-15-2	PAOZZ
	4-15-4	
AN816-5D	4-15-13	PAOZZ
	4-15-24	
	4-15-56	
AN822-5D	4-15-25	PAOZZ
	4-15-33	
AN823-5D	4-15-34	PAOZZ
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AN914-1D	4-15-15	PAOZZ
AN935-10L	4-15-71	PAOZZ
AN960C8	4-15-75	PAOZZ
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MS21919DG5	4-15-20	PAOZZ
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0580560100-1	4-15-43	PAOZZ
10C-0001-0008	4-15-61	PAOZZ
10C-0001-0009	4-15-60	PAOZZ
10C-0001–0033	4-15-5	
10C-0001-0034	4-15-57	PAOZZ
10C-0016-0002	4-15-17	PAOZZ
10C-0016-0008	4-15-9	PAGZZ
10C-0016-0009	4-15-7	PAOZZ
10C-0016-4010	4-15-78	
10C-0016-0017	4-15-76	PAOZZ
10C-0016-0019	4-15-38	PAOZZ
10C-0016-0020	4-15-1	
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10C-0016-0029	4-15-42	PAOZZ
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10C-0016-0060	4-15-30	PADZZ
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20C-0008-1	4-15-50	PAOZZ
20C-0009-1	4-15-14	PAOZZ
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